



The Key Elements of Success and Failure in the NZ Dairy Industry

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Executive Summary

This study is one of four studies of New Zealand agribusiness success.

In 2006 and 2007, The Agribusiness Research and Education Network researched the success of the New Zealand dairy, kiwifruit, sheepmeat and venison industries. These studies are all business history studies focusing on issues of industry strategy, structure, conduct and performance as perceived by industry participants and the AREN research team.

New Zealand is a major player in world dairy markets.

New Zealand exports six categories of dairy products: Milk and cream (not concentrated); Milk and cream (concentrated); Buttermilk and related products; Whey and related products; Butter and related products; and Cheese and curd. Concentrated milk (particularly whole milk powder and skim milk powder) is the largest product category. Cheese and curd is currently the second most important product category having taken over from butter which has declined in relative importance but remains the third most important category. Non-concentrated milk, buttermilk and whey products are smaller categories but whey products have increased in importance in recent years.

The business context for dairy industry participants has been characterised by significant change over the last three decades.

Contextual changes have been significant. European and North American subsidies have distorted markets for much of the period. Low cost producers have emerged in China and Latin America. Dairying has had to respond to animal welfare, and environmental challenges.

Industry structure has evolved considerably over the last three decades.

Structural change has occurred throughout the dairy industry. A key change was the Dairy Industry Restructuring Act 2003 associated with the dissolution of the NZ Dairy Board, the establishment of Fonterra and the removal of statutory monopoly power. The Act was preceded by a long period of industry concentration and has been followed by industry evolution at a fast pace.

Industry conduct and performance have evolved in response to legislative change, business opportunities and business capabilities.

Key developments within the industry have included: enhanced farm productivity, uptake of labour saving technologies, the use of nitrogen fertiliser and supplementary feeds, and ongoing adaptation to new technologies and larger farm size.

Interviews with industry participants identified eight key success factors.

The eight critical success factors identified were: development of international markets; effective political support in international markets; effective political support within New Zealand; effective evolution of industry structure; farmer engagement in policy, strategy, structure and operations; continuing technological advance; maintaining disease free status; and the development of economies of scale.

The dairy industry continues to evolve and faces numerous challenges.

Key challenges identified by industry participants were: increasing animal welfare demands; enhancing animal health; meeting environmental challenges; managing intergenerational transfers; achieving appropriate research investment in pastures; achieving sustainable and efficient industry structures; and sustaining effective international marketing strategies.

Chapter 1

Introduction

THE EXAMINATION OF THE PAST IS ESSENTIAL for drawing lessons from previous experience to inform future decisions. The Agribusiness Research and Education Network (AREN) has undertaken this study of the New Zealand dairy sector as part of a wider analysis of structure, conduct and performance across major agribusiness sectors over the past quarter century. The wider project includes three other agricultural industries - venison, sheep meat, and kiwifruit.

By examining the different stages of development in the dairy industry and identifying the key success factors this research provides a platform to assist robust business practice, research and policy formation in New Zealand's dairy industry.

1.1 Historical background

This project used the sequential framework proposed by Yin (2002) for a multiple-case research. These include define and design; prepare, collect and analyse within case; compare findings from cases (cross-case analysis); and conclude. The first stage of define and design involves a review of studies on business structure, management practises and performance indicators related to agri-food systems in New Zealand and overseas. Following on from this review a brief historical overview for each of the sectors is completed. The review of literature and the historical overviews guides the development of the theoretical framework that underpins the research project, the data to be collected and the specific data collection methods. Theoretical framework is used to develop semi-structured interviews conducted with personnel from a wide range of businesses and organisations involved in each sector, either at present or in the past. The interviews mainly involved open-ended questions following the usual three stages of interviewing: Opening (rapport building), developing and closing (Keats, 2000). Through the interview process key factors influencing management decisions are identified and described. The researchers are seeking to develop descriptions of the firms with respect to structure, strategy and conduct; and to build a clear understanding of their relationship with performance level over the past 20 years.

1.2 The research question

Since the 1980s the New Zealand dairy industry has been through substantial change as a result of internal firm and sector developments, external pressures from customers, governments, competitors and ongoing business evolution. These changes are examined to provide a better understanding of the development path of the dairy industry. This historical review provides an understanding of how business structure and conduct influence the performance of the dairy industry.

The objective of this study is to explore the key elements underlying the success of the New Zealand dairy industry. Therefore in examining the structural changes, conduct and performance of the dairy sector, the research question that we are addressing is:

1.3 What have been the key elements of success and failure in the New Zealand Dairy Industry?

In answering this question, the following questions are addressed:

- *How has New Zealand's dairy sector evolved?*
- *Why did New Zealand's dairy industry evolve the way that it has?*

In responding to these questions this study identifies the range of factors that have driven success in the dairy industry and considers the importance of these factors at different stages in the industry's development.

1.4 Motivation behind the research

This research is motivated by the need for a robust foundational knowledge base on the dairy sector in New Zealand. Future performance can be enhanced as a result of rigorous analysis of the past. This knowledge of the past can directly impact on current policy analysis and new and ongoing research and marketing programmes.

From a planning point of view we have to understand the structure of the dairy industry, its operations, and the practical relationships which already exist between industry participants. Changes that have occurred in the environment in which the industry operates also need to be examined so that future industry challenges can be informed by these past conditions and responses.

1.5 Research coverage

The study explores the nature and performance of the New Zealand dairy industry from 1980 to 2006. As almost 94 per cent of dairy produced in New Zealand is exported the focus of this study is on the export sector of the dairy industry.

Value chain theory is used to define the dairy industry in New Zealand. The value chain links the key participants and organisations that ultimately bring dairy to consumers. Therefore it incorporates the three main stages from the paddocks to market – farming, processing and exporting.

The examination of the industry since 1980 can be separated into the following key focus areas:

- changing market characteristics – production trends, target markets, changing consumer preferences and increasing competition.
- operating environment – how different factors have changed to impact on the industry.
- industry structure – changes at firm and industry level in response to changing circumstances and environments.

- conduct and performance – analysis of broad performance measures, extent of sharing of information, knowledge and resources within the industry, and the degree of interdependence along the value chain.

1.6 Research method

The project proceeded as per the methodology documented by the AREN team (AREN 2006a). To ensure a comprehensive set of respected information sources a list of key individuals from within the industry was required. Hence key industry people including past and current industry leaders were identified. The process identified people from all of the key groups within the industry including: dairy farmers, researchers, industry managers and politicians.

To facilitate participant interpretations of the evolution of the dairy industry a common set of questions was asked of each interviewee. The interviews were undertaken between July and December 2007 and a draft of the report was written. The report was revised after two workshops in early 2008.

1.7 Report structure

In this introductory section a brief overview of the dairy sector in New Zealand provides background to the following chapters. This overview outlines the sector's path to becoming a major participant in world dairy markets. The dairy value-chain is examined to help provide a framework for further analysis of the sector's performance. Further information on the size and location of the sector is also provided.

Chapter two examines the key characteristics of the dairy market- including production, consumption and trade flows since 1980. Chapter three explores the operating environment for the period whilst Chapter four focuses on industry structure. Chapter five explores conduct and performances whilst Chapter six identifies critical success factors. Chapter seven concludes by reporting industry perspectives on future challenges the industry faces.

1.8 Historical background to NZ dairy industry

1.8.1 The path to major export earner

The New Zealand dairy industry has grown considerably during the last three decades as shown in Table 1 and Table 2. Total New Zealand dairy cattle numbers in 1980 were 2.97m down from 3.3m in 1972 but since then, dairy cattle numbers have consistently increased to 5.15m in 2004. Milk solids processed have increased from 491m kg in 1980/81 to 1,267 m kg in 2005/2006.

Table 1.1: Total NZ dairy cattle

<i>Year</i>	<i>Total Dairy Cattle</i>	<i>6 Year Change</i>
1974	3,074,000	
1979	2,900,089	-5.7%
1984	3,245,524	11.9%
1989	3,303,377	1.8%
1994	3,839,184	16.2%
1999	4,316,409	12.4%
2004	5,154,092	19.4%

Source: Dairy Statistics (selected time period)

Table 1.2: Summary of milk production on selected seasons

<i>Season</i>	<i>Milkfat processed (million kgs)</i>	<i>Milksolids processed (million kgs)</i>	<i>Protein processed (million kgs)</i>	<i>Milk processed (million litres)</i>
1974/75	244	425	181	5,222
1980/81	282	491	209	5,868
1985/86	350	609	257	7,326
1995/96	452	788	335	9,325
2005/06	724	1,267	543	14,702

Source: Dairy Statistics (selected time period)

This period of expansion (1980-2006) was built on a well established industry. Participants suggest that the evolution and performance of the NZ dairy industry is strongly shaped by the following key factors.

- Favourable endowment of natural resources for grass production.
- On-going pursuit for innovation and technological improvement by farmers, input suppliers, public research and education institutions, manufacturing, and marketing companies.
- Early access to guaranteed market (UK).
- Farmers' strong ideology towards control and ownership of downstream manufacturing and marketing activities led to vertical integration and continuous institutional and organisational changes.
- Traditional market access challenged by UK joining EU drove the search for new markets and market diversification and ongoing development of global network of NZDB and Fonterra subsidiaries overseas.

After the colonisation of New Zealand, dairy production was mostly aimed at the domestic markets. Some exports to Australia slowly developed. Once refrigeration technology became available, the UK is the major overseas outlet for NZ dairy commodities. The first NZ brand established in the UK was Anchor in 1919. Butter and cheddar cheese were the main products exported to this market until 1973. Trade slowed down when UK announced it would join the EC. The threat of increasing trade barriers motivated the NZ dairy industry to explore South East Asia (SEA) and to seek diversification of products because South East Asia was not a market for butter and cheese. This led to increased investment in the Dairy Research Institute in Palmerston North.

Ongoing growth in trade with South East Asia was based on milk powder and reconstitution of milk powder in consumer products. Initially the strategy is based on recombining milk powder in NZ owned plants overseas. This strategy proves unsuccessful and is changed to selling milk powder to local companies.

NZ Dairy Industry Structural and Institutional Development Landmarks Prior to the Study Period	
1920s-1930s	The New Zealand dairy industry had 240 dairy companies
1927	The New Zealand Dairy Research Institute was founded as a branch of the Department of Scientific & Industrial Research
1931	The New Zealand National Milk Grading System was initiated, following work of the DRI on the quality testing of milk
1940s	The New Zealand dairy industry had 230 dairy companies
1947	NZDRI's first Annual Report was issued and DRI became incorporated under the Religious, Charitable & Educational Trusts Act of 1908
1950s	The New Zealand dairy industry had 220 dairy companies
1953	The Buttermaker's Manual was published by the DRI
1960s	The New Zealand dairy industry had 100 dairy companies
1961	NZDB was established by the government
1965	DRI moves from Massey University to a new building on its current site, and was renamed the New Zealand Dairy Research Institute. A decision was made to diversify products and markets in anticipation of the primary market (the UK) joining the European Economic Community (EEC)
1970s	The New Zealand dairy industry had 90 companies

1.8.2 The dairy value chain

For analysis, it is useful to break the dairy industry into separate value generating activities that form the dairy value chain. Identifying these activities provides insight into how value is created within the industry and also highlights the important links between various components of the industry. Therefore the dairy value chain provides a vital framework for examining the key elements of success and failure in the New Zealand dairy industry. As previously noted almost 94 per cent of total dairy production is exported therefore for simplicity the value chain used in this study focuses only on the export path.

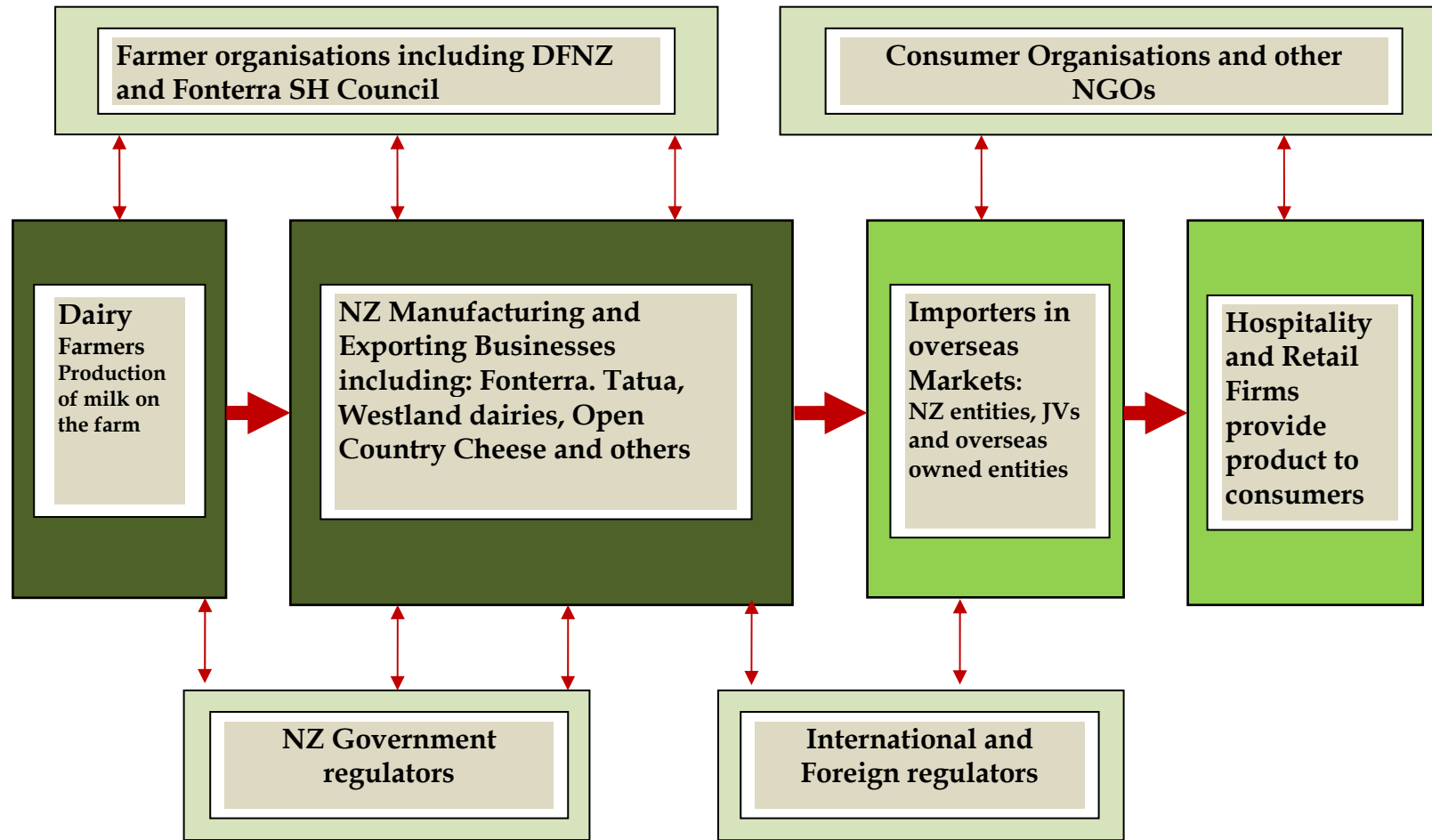
As illustrated in Figure 1.2 the dairy industry in New Zealand can be separated into three broad value generating activities:

- dairy farming;
- manufacturing and distribution; and
- exporting - incorporating the marketing and distribution to overseas markets.

The first value generating activity in the dairy industry - the production of milk at the farm - includes the full range of animal and plant husbandry, milk harvesting and business management.

The final stage in the New Zealand dairy value chain is the international marketing of NZ dairy products.

Figure 1.1: The New Zealand Dairy Export Value Chain in 2007



Chapter 2

Performance of the New Zealand Dairy Industry

In considering the success of the New Zealand dairy industry two key themes emerged. On farm success and success of the industries manufacturing and export activity.

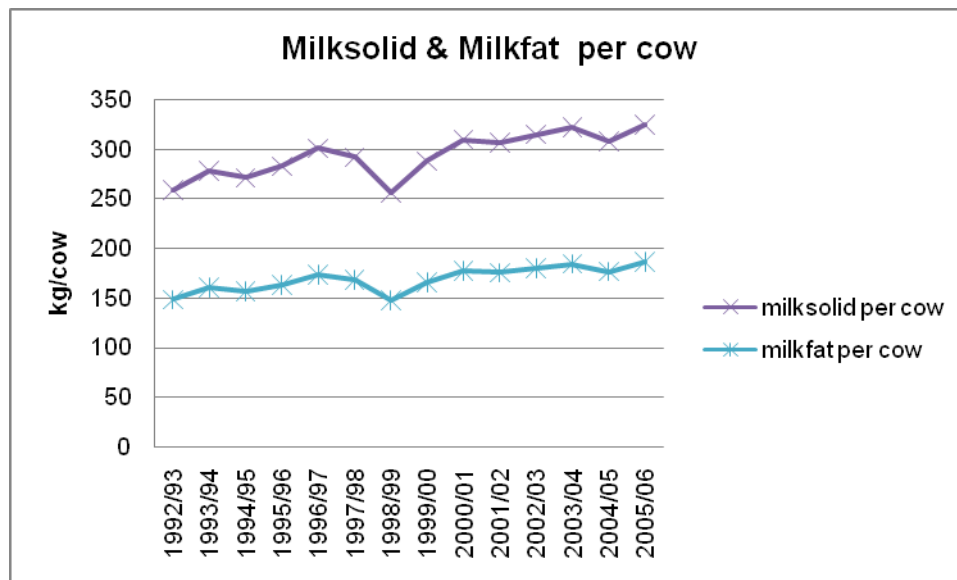
2.1 Performance of dairy farms

Participants argued that for dairy farms, operating efficiency is the single most important key to survival and success. This was frequently attributed to New Zealand being one of the lowest cost producers of milk in the world due to a suitable environment for dairy farming and having technological and business savvy farmers.

Participants saw success in two parts – surviving the 1980s when export prices were low, government support was removed and interest rates were exceptionally high – and secondly in the growth of wealth in the 1990s and the first part of this century.

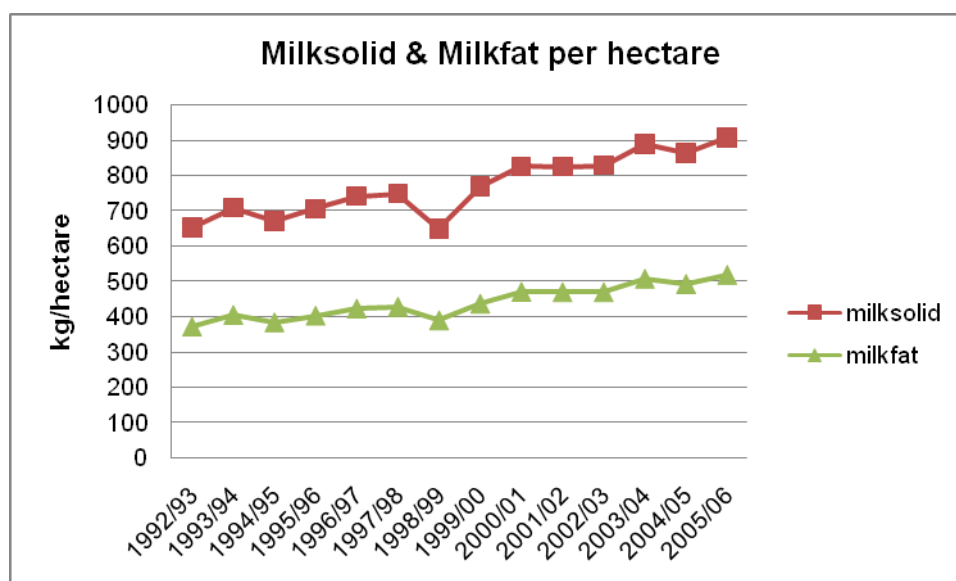
The literature shows a number of measures are taken to assess the efficiency of dairy farms, including average milksolid per hectare (average milkfat per hectare), average milksolid per cow (average milkfat per cow), and average cows per hectare, so that farm output is measured on both per cow and per hectare basis.

Figure 2.1: Average milksolid & milkfat per cow



Source: Livestock Improvement Corporation Limited

Figure 2.2: Average milksolid & milkfat per hectare



Source: Livestock Improvement Corporation Limited.

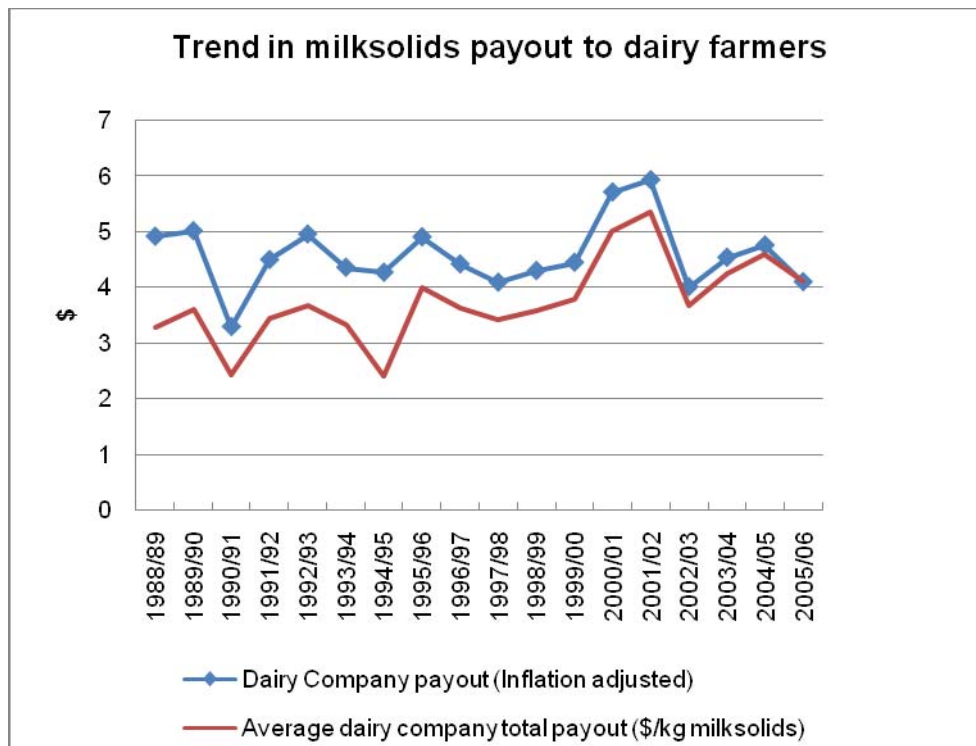
As can be seen in Figure 2.2, milksolid (milkfat) produced on per hectare basis and on per cow basis has trended upward during the study period. From 1988/89 season to 2005/06 season, average milkfat produced per cow jumped over 30 per cent from 143kg to 186kg per cow. Since the 1992/93 season, average milksolid produced per cow jumped 25.5 per cent from 259kg to 325kg per cow. On a per hectare basis, improvement in efficiency is even more evident. Average milkfat produced per hectare increased from 340kg in 1988/89 season to 520kg in 2005/06 season, a 53 per cent jump. Average milksolid per hectare increased from 653kg to 907kg, a 39 per cent jump.

It is important to emphasize the interaction between weather, economic drivers and management/technological drivers in achieving production outcomes. Regional climatic variation means that regional production variation between seasons is greater than national production variation.

2.2 Performance of the processing and marketing

Participants saw the success of the dairy manufacturing and export marketing as being revealed in payout for milk. All Participants are aware of the limitations of this measure but saw it as a useful proxy - with the caveat that one has to be careful in its interpretation. A commonly expressed view is that the payout had been “better” since the “disastrous 1980s” but the payout had not kept up during the 2004-2006 period when costs had been rising but payout had not. Subsequently, there has been a record payout and a very significant decline but these occurred after the interviews were conducted.

Figure 2.3: Trend in milksolids payout to dairy farmers



Source: Statistics New Zealand, 1988/89-2005/06

Note: Weighted to give real dollar values using the Consumer Price Index for the end of the June Quarter

As shown in Figure 2.3, payouts to farmers demonstrate considerable volatility over different seasons, with a low of \$3.29 per kilo in 1990/91 season to a high of \$5.94 per kilo in 2001/02 season. Despite fluctuating international market conditions, New Zealand dairy co-operative managed to keep payout to farmers above \$4 per kilo (except in one season), and largely between \$4 and \$5 per kilo over a relatively long period of 18 seasons.

Table 2.1: Some performance indicators for the New Zealand Dairy Industry

	Economic Size & Scale	Per Unit Productivity	Reasons
On Farm	<ul style="list-style-type: none"> • Average herd size has a consistent upward trend for the last 25 years; it has more than doubled in the last twenty years. • Dairy cattle numbers have increased from 2.9m in 1980 to 5.2m at 30 June 2006 • From 1981/82 to 2005/06, average New Zealand stocking rate increased from 2.10 to 2.77 cows/ha 	<ul style="list-style-type: none"> • Average milk solids per cow are up 25% to 325kg from 1992/93 to 2005/06 season • Average herd milk solids per effective hectare has increased since 1992/93 from 653kg to 907kg 	<ul style="list-style-type: none"> • Increasing dairy production through enhanced animal and pastoral husbandry • Increasing use of supplementary feed e.g. imported palm kernel • More fertilizer applied on dairy farms
Manufacturing	<ul style="list-style-type: none"> • Fonterra Co-operative Group Ltd – 14.34 billion litres milk production, external sales volume 2.5 million tonnes • Westland Co-operative Dairy Company Ltd – 70,158 tonnes milk production 	<ul style="list-style-type: none"> • The average dairy company total payout (\$/kg milk solids) received by dairy farmers demonstrates considerable volatility over each seasons, with a low of \$3.29/kg in 1990/91 to a high of \$5.94/kg in 2001/02 	<ul style="list-style-type: none"> • Large factories • More automation
Market	<ul style="list-style-type: none"> • Significant volume in growth in the EU, South East Asia, Latin America, China, US and the Middle East • Over the period, China became a very important dairy export destination for New Zealand (from 0.8% in 1988 to 6.14% in 2006). • Significant volume growth in WMP, SMP and cheese 	<ul style="list-style-type: none"> • No good metrics 	<ul style="list-style-type: none"> • World demand for dairy products increases • Reducing foreign subsidies and stocks • Brand development • Improved partnerships

Chapter 3

Environmental Drivers of the NZ Dairy Industry

This section presents and discusses key driving forces in the operational environment and their influence on the evolution of strategy, structure, conduct and performance. Participants discussed political drivers (domestically and offshore), international market conditions, domestic economic drivers, and social and technological factors. However, their emphasis is on international drivers as many indicate that the NZ biophysical environment was attractive for dairy farming so long as milk prices are sufficient to sustain it.

Table 3.1: Summary world statistics for dairy products

	Production			Consumption		Exports	
	Milk Mt	Butter kt	Cheese Kt	Butter kt	Cheese Kt	Butter kt	Cheese kt
1980	390	6 291	8 342	5 982	7 972	1 355	1 358
1981	389	6 075	8 381	5 776	8 004	1 343	1 428
1982	405	6 375	8 811	5 721	8 426	1 312	1 484
1983	421	6 918	9 168	6 066	8 769	1 197	1 504
1984	424	6 857	9 581	6 219	9 313	1 337	1 703
1985	430	6 929	9 962	6 443	9 645	1 400	1 721
1986	438	7 217	10 295	6 568	10 064	1 310	1 734
1987	435	6 737	10 599	6 963	10 374	1 820	1 770
1988	436	6 604	10 717	7 070	10 385	2 090	1 786
1989	438	6 747	10 975	6 404	10 692	1 769	1 785
1990	441	6 797	11 025	6 382	10 744	1 368	1 838
1991	428	6 306	11 068	5 893	10 677	1 410	1 926
1992 b	424	6 056	11 218	5 875	10 823	1 442	2 036
1993	394	5 657	11 093	5 286	10 729	1 422	2 242
1994	384	5 348	11 240	5 188	10 950	1 320	2 338
1995	381	5 218	11 346	4 966	11 037	1 233	2 467
1996	380	5 136	11 705	4 844	11 325	1 131	2 582
1997	370	5 171	11 100	4 931	11 061	749	943
1998	374	5 397	11 378	5 083	11 190	627	907
1999	380	5 653	12 016	5 251	11 845	618	912
2000	387	5 814	12 499	5 404	12 173	718	1 068
2001	391	6 145	12 602	5 770	12 416	745	1 086
2002	402	6 565	13 019	6 062	12 711	747	1 157
2003	406	6 613	13 014	6 205	12 847	867	1 181
2004	412	6 625	13 538	6 250	13 298	905	1 241
2005	418	6 725	14 002	6 333	13 781	797	1 250
2006	424	7 046	14 178	6 724	13 984	765	1 202

Source: US Department of Agriculture

Note: a includes intra-EU trade up to and including 1993. b for years up to and including 1991, includes data for 38 selected major countries; from 1992, includes data for 31 major countries.

3.1 International drivers of industry

Participants highlight the impact of changing production and export volumes from competitor suppliers. Table 3.1 reports summary statistics. Participants are also mindful of the impact of competitor's dairy subsidies and their impacts on production and resultant dairy stocks have on the market. Table 3.2 provides information of key stocks for part of the period.

Table 3.2: Stock of dairy products in principle producing countries

	1999 kt	2000 kt	2001 kt	2002 kt	2003 kt	2004 kt	2005 kt	2006 kt
BUTTER								
Australia a	21	14	6	2	2	8	14	10
Canada	14	15	20	13	13	15	20	17
European Union b	115	136	151	248	276	232	185	122
New Zealand c	93	72	50	51	31	23	46	46
United States	11	11	25	72	45	20	27	49
Total	344	325	317	453	423	342	335	277
CHEESE								
Australia a	77	65	58	73	55	51	25	15
Canada	42	46	49	52	59	59	62	64
European Union b	0	0	0	0	0	0	0	0
New Zealand c	13	34	43	51	36	26	46	46
United States	282	322	301	332	324	322	344	371
Total	511	559	553	604	559	518	536	555
SKIM MILK POWDER								
Australia a	19	2	18	16	7	5	39	38
Canada	6	17	19	8	23	41	38	31
European Union b	209	51	45	188	218	77	8	0
New Zealand c	54	71	98	100	70	35	35	35
United States	113	288	408	521	445	232	83	49
Total	576	637	807	1 041	949	563	365	283

Source: US Department of Agriculture, Production, Supply and Distribution Database, Washington DC.

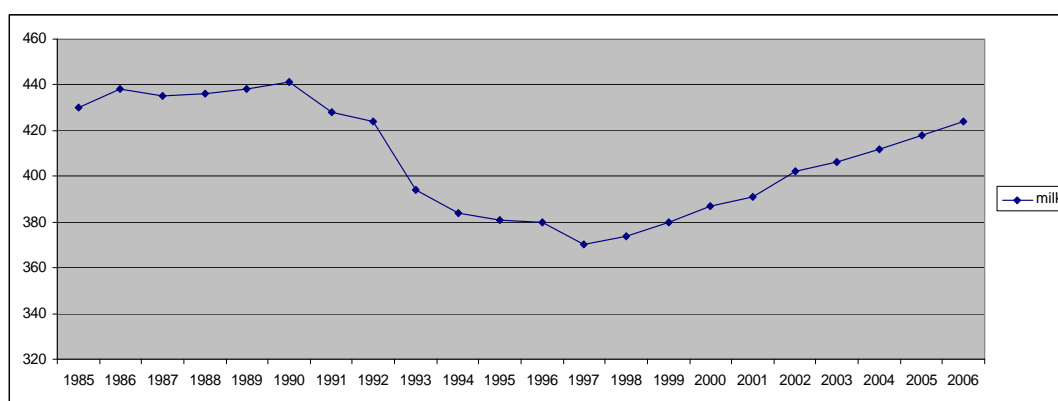
Note: a year ending 30 June. b Regarded as fifteen countries to 1999, then twenty five countries from 2000.

c year ending 31 May.

It is important to note the significant drop in the stock/export ratio during the period. This ratio has moved very significantly for cheese and whole milk powder. This reduction is a sharp contrast to an earlier part of the period when European and North American subsidies were higher. Further it is appropriate to note that products are not equally durable in storage. It appears that Whole Milk Powder deteriorates faster than Skim Milk Powder and butter and hence stocks of different products have a different impact on the market price.

Global milk production has been an important challenge given that international trade is a small share of global production. World production of milk fluctuated over the last two decades with a peak in 1990 (441 million tonnes), a decline in the beginning of 1990s and a significant drop in 1997 (370 million tonnes), followed by a steady trend of increase since 1998, which reached 424 million tonnes of milk in 2006 (Figure 3.1).

Figure 3.1: World production of milk 1985-2006 (million tonnes)



Source: USDA

Note: Includes data for 38 selected major countries; from 1992, includes data for 31 major countries.

A more comprehensive overview of milk production by regions and countries is presented for 2001-2006 in Table 3.3. The world's biggest producers of milk are EU-25 (France, Germany, UK, Poland and Netherlands) and USA followed by India. China's growth in milk production has been considerable in the last few years with an increase from 6,420 million tonnes in 2000 to almost 32 million tonnes in 2006. The rate of increase in North and South America slowed down. New Zealand produces about 3-4 per cent of the world milk.

Table 3.3: Production of milk in selected regions and countries – 2000-2006 (million tonnes)

	2000 MT	2001 MT	2002 MT	2003 MT	2004 MT	2005 MT	2006 MT
Americas							
Canada	8 161	8 106	7 964	7 734	7 905	7 806	7 773
United States	75 929	74 994	77 140	77 290	77 534	80 254	82 462
Brazil	22 134	21 125	22 292	22 922	24 179	25 309	25 750
Asia							
India	36 250	36 400	36 200	36 500	37 500	37 520	38 750
China	6 420	10 255	12 998	17 463	22 606	27 534	31 934
Europe							
European Union a	129 392	130 069	131 040	131 847	130 620	131 652	130 400
Russia	31 938	33 000	33 467	33 300	31 935	31 002	31 100
Oceania							
Australia b	23 407	24 026	25 533	24 982	25 377	24 929	25 595
New Zealand c							
	11 172	10 864	11 608	10 636	10 377	10 429	10 395
c	12 235	13 162	13 925	14 346	15 000	14 500	15 200
Total d	386 769	391 409	402 266	406 378	412 336	418 152	423 874

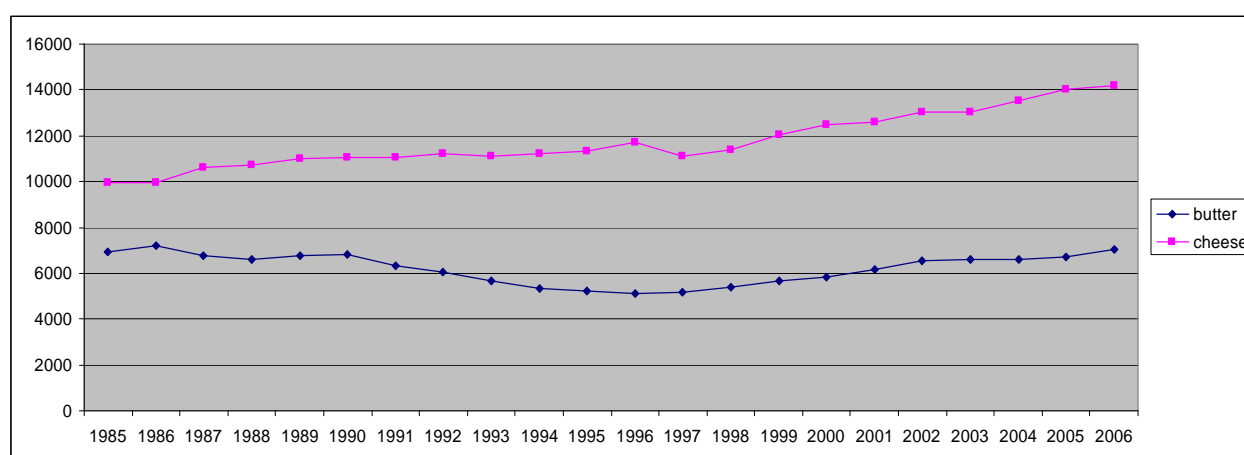
Source: USDA; IDF (International Dairy Federation).

Note: Includes 31 major producing countries.

3.2 Global production of dairy products

The production of dairy products presented in Table 3.4 tends to follow milk production. Butter production fluctuated with a decline in the 1990s and a steady upward trend since 1998 and world cheese production trended upwards between 1985 and 2006, increasing 70 per cent since 1980.

Figure 3.2: World production of butter and cheese – 1985-2006 (million tonnes)



Source: US Department of Agriculture

Note: Includes data for 38 selected major countries; from 1992, includes data for 31 major countries

Table 3.4: Production of dairy products in selected regions and countries – 1999-2006
(thousand tonnes)

	1999 MT	2000 MT	2001 MT	2002 MT	2003 MT	2004 MT	2005 MT	2006 MT
BUTTER								
Australia abc	189	182	172	178	164	149	147	146
Ukraine	102	135	158	131	145	113	118	102
Russian Federation	260	265	270	280	280	270	275	290
European Union d	2 039	1 995	2 021	2 226	2 226	2 154	2 140	2 055
Japan e	86	88	80	83	80	80	84	80
New Zealand bcf	316	344	352	380	405	418	340	390
United States	579	570	559	615	564	565	611	657
CHEESE								
Australia a	328	373	376	412	379	384	388	373
Canada		325	330	335	342	346	352	359
Russian Federation	185	220	260	340	335	350	375	405
European Union d	5 711	5 861	5 865	5 993	6 100	6 371	6 480	6 580
Argentina		453	431	378	332	378	414	367
Brazil		445	460	470	460	468	470	490
New Zealand g	245	297	281	312	301	305	297	285
United States	3 581	3 746	3 747	3 877	3 882	4 025	4 150	4 325
SKIM MILK POWDER								
Australia a	249	236	244	239	197	182	189	205
Brazil	60	62	103	107	108	110	113	117
Russian Federation	130	125	130	140	145	125	110	110
European Union d	1 325	1 322	1 215	1 369	1 326	1 066	1 065	975
Japan	192	194	175	183	183	183	187	181
New Zealand g	203	197	227	255	289	274	225	247
United States	617	659	641	724	721	641	695	686
WHOLE MILK POWDER								
Australia a	187	205	239	194	187	189	158	139
European Union	895	971	927	868	870	856	851	779
Russian Federation	79	75	106	92	90	91	85	90
China	552	615	610	680	830	900	900	1100
Brazil	244	256	345	355	390	420	440	465
New Zealand g	450	515	500	615	650	670	675	650
Argentina	244	202	203	140	106	182	166	215

Sources: Australian Dairy Corporation; Agriculture and Livestock Industries Corporation, Japan; Ministry of Agriculture and Fisheries, New Zealand; USDA; IDF; ABARE.

Note: a year ended 30 June. b Includes butter anhydrous milk fat and ghee. c Factory production only. d Regarded as fifteen countries to 1999, then twenty five countries from 2000. e year ended 31 March. f year ended 31 May. g Includes imported unprocessed cheese which is blended with domestically produced cheese.

3.3 Global trade in dairy products

Global trade in dairy products is shown in Table 3.5 and the figures fluctuate significantly. It is important to note the significant volumes of product exported from Europe, North America, Argentina and Australia. Participants are particularly cognisant of production increases in central Europe and South America and the significant growth in Australia relative to 30 years ago.

Table 3.5: Volume of exports of dairy products, by selected countries (thousand tonnes)

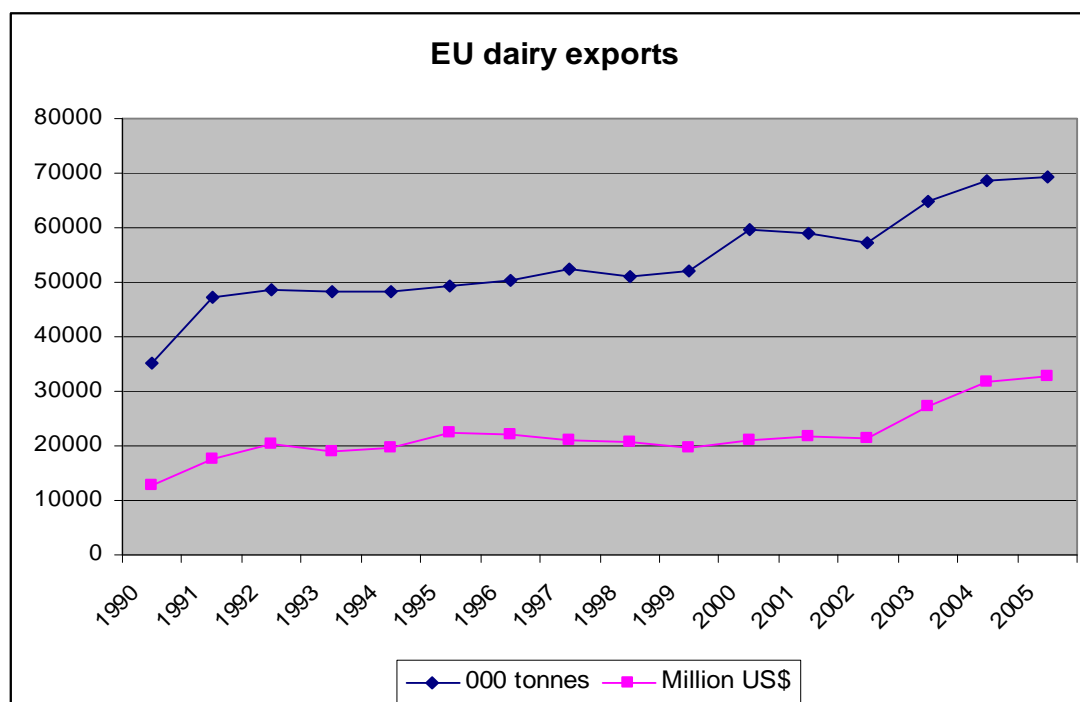
	1999	2000	2001	2002	2003	2004	2005	2006
	MT	MT	MT	MT	MT	MT	MT	MT
BUTTER								
Australia ab	117	137	120	123	111	84	69	83
Canada	11	10	16	17	12	17	20	18
European Union c	189	185	196	222	307	354	345	254
New Zealand ab	279	338	347	353	399	400	316	365
Belarus		23	27	40	30	47	51	54
Ukraine	8	31	53	15	18	42	24	18
United States	2	4	0	3	12	9	9	11
CHEESE								
Argentina	20	22	18	26	23	31	52	55
Switzerland	60	58	58	55	55	56	57	56
Belarus	9	17	24	28	38	53	65	83
Australia a	175	220	219	218	208	212	228	202
European Union c	408	483	485	516	514	516	492	529
New Zealand ab	240	253	251	277	290	289	265	260
United States	38	47	53	54	52	61	58	71
SKIM MILK POWDER								
Australia a	221	218	203	210	182	156	141	181
European Union c	372	453	284	267	339	283	194	88
New Zealand ad	205	175	195	248	314	305	221	243
Ukraine	15	49	71	43	51	63	57	65
United States	217	142	96	126	141	231	277	287
WHOLEMILK POWDER								
Australia a	169	183	218	200	159	152	161	155
European Union c	576	575	477	495	481	504	494	430
New Zealand ad	393	474	476	540	657	580	585	634
Argentina	149	104	83	135	110	181	162	190
United States	18	25	39	42	11	16	12	10

Sources: ABS, International Trade, Australia; Ministry of Agriculture and Fisheries, New Zealand; US Department of Agriculture; ABARE; IDF; IDFA.

Note: a Year ended 30 June. b Includes butter, anhydrous milk fat and ghee. c Regarded as fifteen countries to 1999, then twenty five countries from 2000. Excludes intra-EU trade. d Skim milk and buttermilk powder.

As many participants mentioned, the EU is a significant dairy exporter, which is a major competitor for New Zealand. Figure 3.3 shows the EU dairy exports for the period 1990-2006. EU dairy exports almost doubled during this period and their stocks have decreased.

Figure 3.3: EU dairy exports – 1990-2006



3.4 Global imports of dairy products

Participants commented on the evolution of demand over the last two decades. Russia has gone from being a trade partner (e.g. the butter for Ladas deal) to become the largest importer of butter and cheese. Indonesia and the Philippines have emerged as major importers of skimmed milk powder. The Middle East and China have emerged as major importers of whole milk powder. By way of contrast, Brazil is no longer a major importer of whole milk powder. Participants discussed the relationship between oil prices and food prices. The oil shocks of the 1970s are well remembered in the industry. Similarly, in 2007 high oil prices and growing demand for biofuels was influencing industry perceptions of future demand. The impact on agricultural commodity prices was seen in 2007 and early 2008 and subsequently slumped with the credit crunch led recession of 2008-2009.

Table 3.6: Volume of imports of dairy products, by selected countries

	1999 kt	2000 kt	2001 kt	2002 kt	2003 kt	2004 kt	2005 kt	2006 kt
BUTTER								
Egypt	43	49	45	50	47	28	41	45
European Union ^a	98	88	93	92	92	93	82	84
Mexico	34	34	35	37	40	53	51	49
Russian Federation	55	60	110	120	160	170	110	115
United States	18	15	34	16	15	23	16	17
World	764	954	962	1,076	929	920	888	890
CHEESE								
Australia	31	33	38	50	49	50	58	58
European Union ^a	128	134	142	116	127	106	95	101
Japan	187	205	202	204	194	219	212	207
Korea, Rep. of	21	30	34	31	36	41	44	45
Mexico	44	54	66	65	78	82	89	86
Russian Federation	60	60	140	130	175	190	250	230
Saudi Arabia	77	63	67	89	95	106	109	-
United States	195	186	198	214	216	209	204	203
World	1,181	1,398	1,290	1,347	1,430	1,450	1,480	1,580
SKIM MILK POWDER								
European Union ^a	36	64	48	30	56	26	7	19
Indonesia	58	95	98	110	120	125	135	140
Russia	109	51	65	50	60	65	70	60
China		22	18	35	45	55	43	62
Japan	57	52	53	44	43	37	34	32
Mexico	123	129	141	132	129	141	155	111
Philippines	87	108	89	100	110	120	87	90
Algeria	71	70	97	114	100	90	83	60
World	1,114	1,261	1,040	1,103	1,040	1,100	1,070	1,070
WHOLEMILK POWDER								
Algeria	106	110	110	116	115	161	167	172
Brazil	147	108	43	95	33	23	29	27
Venezuela	67	67	90	78	92	123	95	120
Saudi Arabia	97				84	109	92	90
China	n/a	29	23	26	98	96	76	73
Malaysia	54	76	80	71	75	83	71	71
World	1,508	1,529	1,573	1,727	1,716	1,720	1,650	1,750

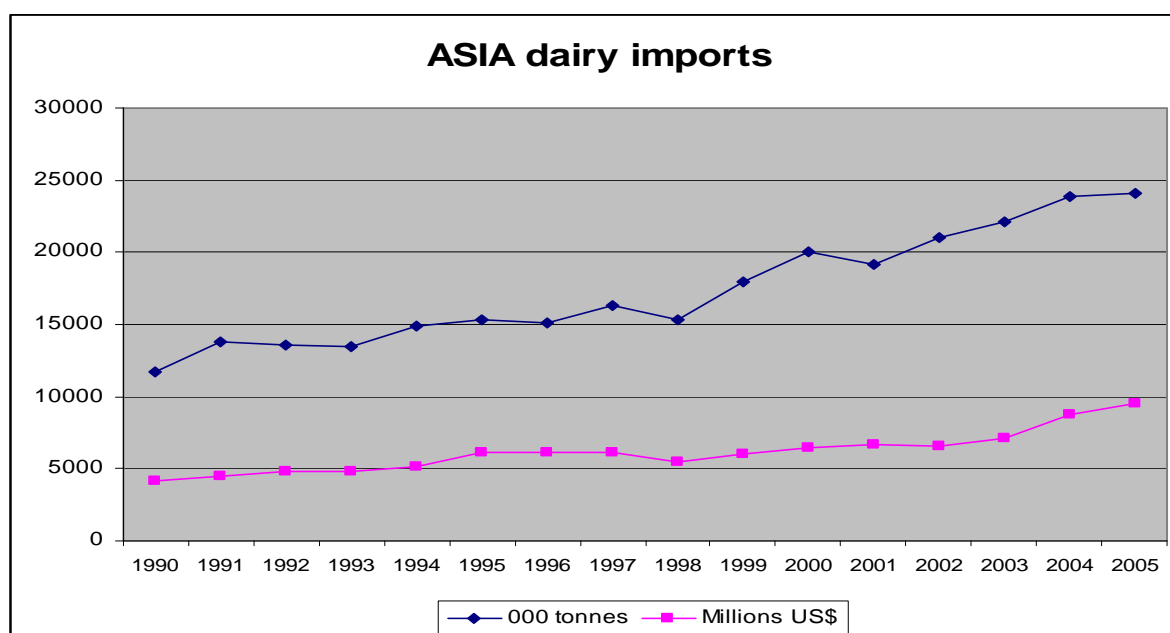
Sources: US Department of Agriculture, IDF.

Note: ^a Regarded as fifteen countries to 1999, then twenty five countries from 2000.

Excludes intra-EU trade.

As mentioned above, the Asian dairy market is very important for NZ dairy exports. As reflected in Figure 3.4, the Asian markets are very dynamic and demonstrate a growth of about 100 per cent over the last 16 years.

Figure 3.4: Asia dairy imports – 1990-2006



China is the world's fastest growing dairy market. However, its domestic production is also increasing rapidly.

3.5 Public policies and regulations (national and international)

Public policies and regulations are perceived to have significant impacts on the industry for good and for bad. Some key items of consensus mentioned by participants are:

Participant Views of Policy Impact on Industry

Good impacts	Bad impacts
<ul style="list-style-type: none"> Assistance with trade negotiations Dairy industry restructuring Act (2001) allowing bypass of Commerce Commission 	<ul style="list-style-type: none"> Introduction and removal of SMPs Removal of support for extension and reduced commitment to research Loss of domestic market Aspects of environmental regulation

3.5.1 Key players in the industry

Participants highlighted the key contributions that individuals have made in the industry. The following list is illustrative of the names that were frequently noted:

- Farmer politicians/directors such as Dryden Spring, Henry van der Hayden, John Roadley, John Young, Greg Gent, and Graham Fraser who got things done.

- Industry executives such as Alistair Betts, Warren Larsen, Craig Norgate and Bernie Knowles who brought forth innovation and professionalism.
- Politicians such as Michael Cullen and John Luxton who have had a major role in facilitating industry evolution on certain paths.
- Thinkers such as Alan Frampton and Dennis Hussey who recognised and advocated different ways of being the dairy industry.
- Farmer politicians such as Lloyd Downing who were voices of influence in public and behind the scenes.
- Scientists such as Arnold Bryant, Pat Shannon, Jeff Stichbury, and Jock McMillan who advanced new technologies that shaped the industry.

3.5.2 Social factors

Participants identified a range of social factors that impacted on the industry. The settlement of Treaty issues has impacted upon land ownership and has expanded the strength of Iwi as significant players in the business world. The increasing recognition of Maori rights has implications especially in the area of environmental matters as a partner in resource management through the RMA. The changing values coupled with an ascendancy of “green” concerns both nationally and internationally, led to modifications in the approach to animal husbandry, nitrates and run-off, energy conservation and food miles. The industry is showing willingness to embrace the changes albeit with levels of frustration especially in the areas of RMA concerns. Carbon footprints and sustainability are a present and future significant issue for the industry.

Societal expectations regarding the provision of services including amenities, recreation, technology and other lifestyle factors have impacted upon rural life. Technology in the areas of information communication technology (ICT) has impacted expectations about telephone services, satellite television, etc., which flows through to what workers and potential labour and farm children expect from life. Dairying has had to move to accentuate the positive to compete.

3.5.3 Technological factors

Some participants thought technological advances are becoming increasingly rapid and the industry is moving to be at the fore in terms of international adoption. The continuing drive for productivity and quality assurance has drawn upon advances in veterinary technology, innovations in milking, transport and processing. The availability of sustainable energy supplies and meeting potential global warming require further advances in technology and adoption.

The process of technological adoption at the farm level is noted as being ad hoc with lead farmers typically being early adopters, demonstrating a first mover advantage and then followed by other farmers who observe the progress. This ripple pond can be improved to attract more advantages earlier through better network communication and training.

3.5.4 Natural environment factors

Participants comment that the limits of the environment are more acutely noticed and partly influenced through the capacity of media to tell stories widely and rapidly. The growing political attractiveness of environmental maintenance is noted as pointing to greater activity at the regional council level. While progress at the industry accord level is moving forward there are farmers who show a reluctance to cooperate and a more widespread sentiment that there is a lack of understanding/tolerance at the bureaucrat level of occasional difficult circumstances necessitating an unfortunate emission.

The international environmental concern, as expressed most recently in the food mile debate, is noted as a significant problem on the horizon. While the science of environment is steadily being pursued, the political environmental spectres like food miles rose in Europe and elsewhere, reflecting non-tariff trade barriers, are nevertheless very real and very threatening.

Trade with countries with a less than exemplary environmental track record, and for that matter human rights issue, was also seen by participants as a future problem.

Chapter 4

Evolution of the NZ Dairy Farm Sector

Participants describe how the dairy industry emerged from a period of contraction to become one of the fastest growing sectors in the New Zealand economy for a sustained period. They describe how dairy farming was dramatically affected by the deregulation of the economy in the early 1980s. The 1978-79 seasons were a significant year for New Zealand agricultural policy change as the Supplementary Minimum Price (SMP) payments was introduced for major primary products (including dairy). The main objective of the scheme was to complement existing industry stabilization schemes by setting a reasonable guarantee of a minimum income level and thereby offering an assured base for forward planning without losing sight of long-term relativities (“International Dairy Products Council”, 1984). The removal of this scheme coincided with low dairy prices and high interest rates and caused significant stress to farmers.

Participants described a series of farm management and farm business initiatives which characterise survival, change and success, including those described in the following box:

Examples of Developments

Farm Management

- The fast uptake of labour replacement technologies allowing individuals to manage large herds and multiple herds
- The move to Friesian cows and then move away from Friesian cows as farmers sought to optimise performance
- The use of nitrogen to boost pasture growth at critical times
- Improved animal health strategies resulting in less leptospirosis, brucellosis and TB
- The growing use of supplementary feed including maize silage and palm kernel
- The development and adaptation of farming systems that fitted local conditions such as those in the SI
- The adoption of once a day milking in situations where it was perceived to be appropriate

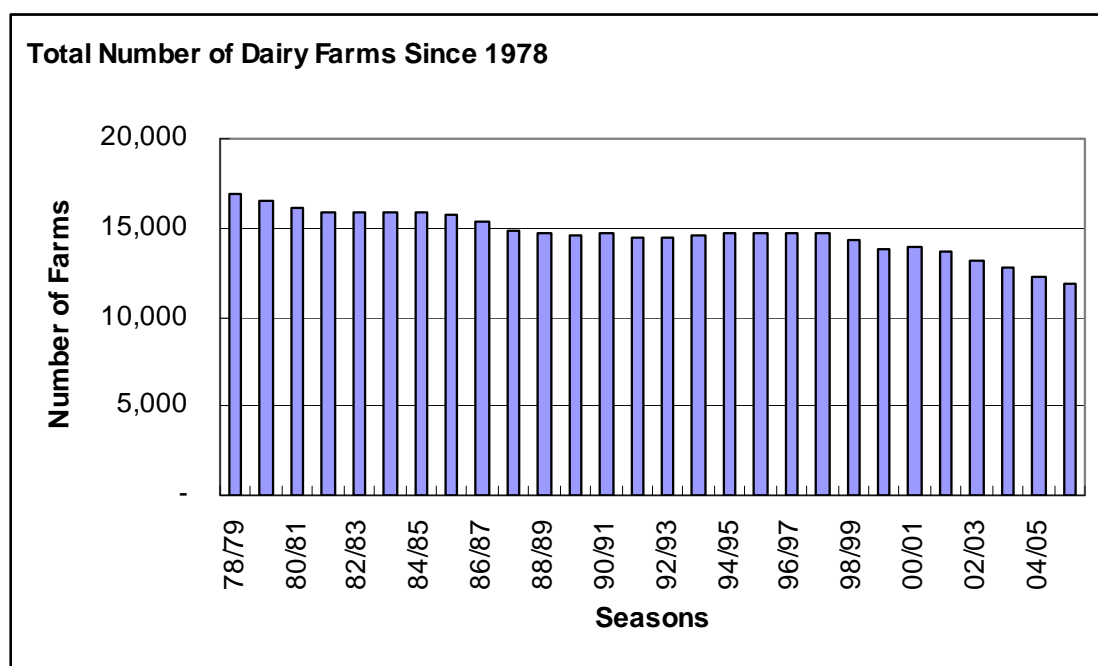
Farm Business Management

- Farm consolidation to facilitate scale economies
- Development of the Family Corporates as a mechanism to raise capital and sustain control
- Evolution of share milking contracts and equity partnerships in innovative ways

4.1 Trend in number of dairy farms

Participants noted how the New Zealand dairy industry has sustained a downward trend in farm numbers in both good and bad times. The corollary of this is the average herd size has grown considerably during the period from approximately 140 in 1980/81 to approximately 340 in 2006/07.

Figure 4.1: Total number of dairy farms since 1978



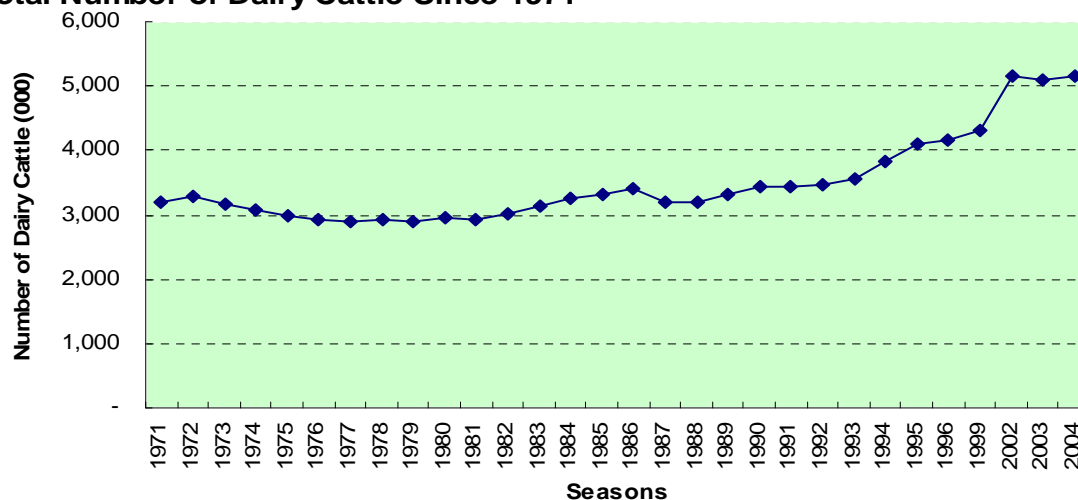
Source: LIC, 1978-2005 [online: http://www.lic.co.nz/pdf/dairy_stats/ Accessed 19/11/07]

4.2 Changes in livestock numbers

While the number of dairy cattle fluctuated within a narrow range from 2.9 million to 3.4 million in the 1970s through to 1990 (see Figure 4.2), there was a steady increase in the national number of dairy cattle in the early 1980s. Since 1990 the number of dairy cattle has increased to 5.2 million at 30 June 2006. During this period, there has been a remarkable change in the South Island A (see Figure 4.3), where dairy cattle numbers have increased from 225,000 to 1.5 million, and increased from 8 per cent to 28 per cent of the national dairy herd (Statistics New Zealand, 2006). Despite the overall increase in the number of dairy cattle, there was a small downward movement between 2002 and 2006 in North Island.

Figure 4.2: Total number of dairy cattle since 1971

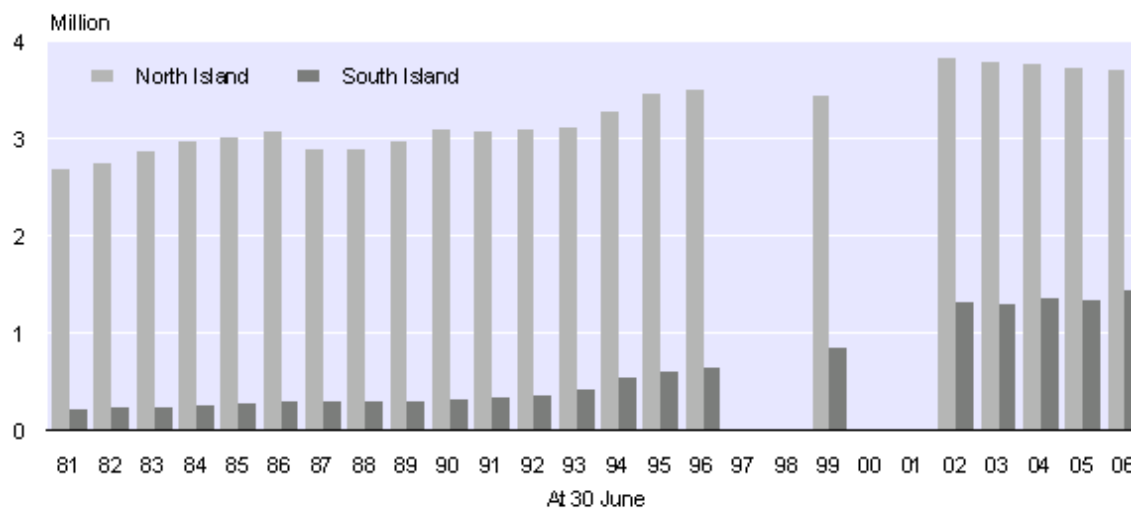
Total Number of Dairy Cattle Since 1971



Source: Statistics New Zealand. Table compiled by Policy Information Group, Ministry of Agriculture and Forestry

Figure 4.3: Dairy cattle numbers in North Island and South Island

Dairy Cattle Numbers in North Island and South Island
1981–2006



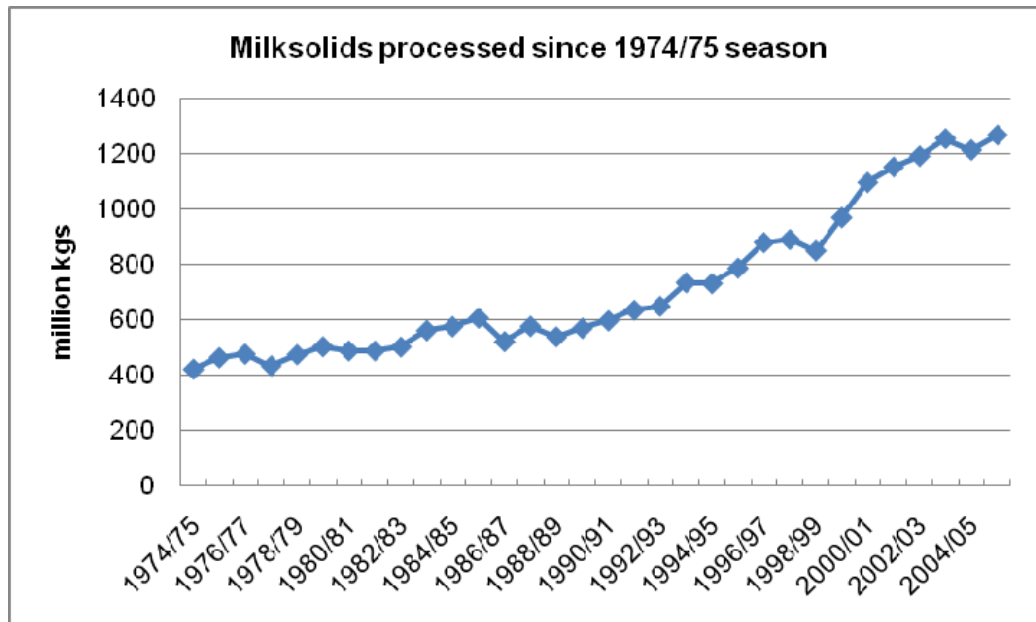
Note: No Agricultural Production Survey was conducted for 1997, 1998 or 2001. In 2000, the survey related only to horticulture.

Source: Statistics New Zealand

4.3 Increased production

Figure 4.4 shows milksolids production had a consistent upward trend over the last thirty years, and participants attributed this to genetic gain, improved feeding and general improvements in farm management.

Figure 4.4: Milksolids processed since 1974/75 season



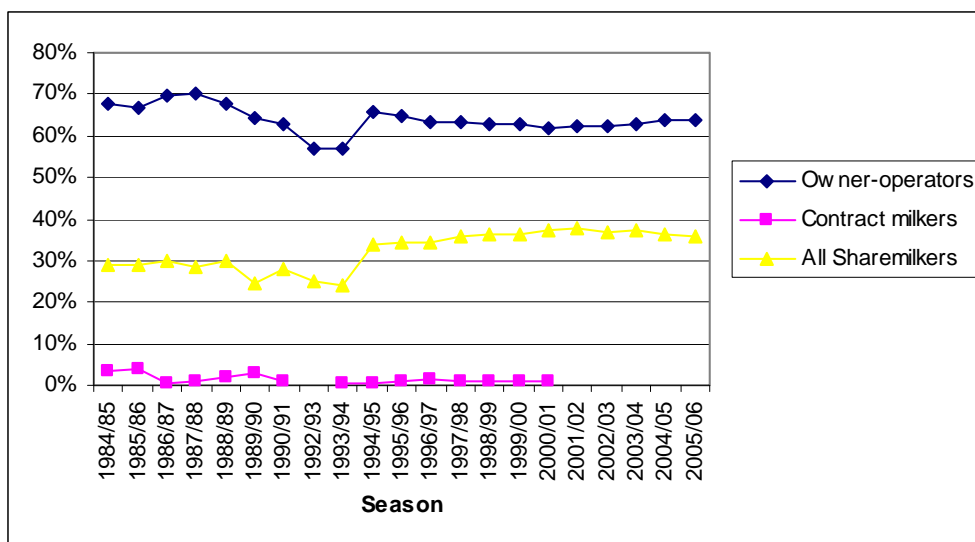
Source: LIC, 1974/75-2005/06

4.4 Operating structure

Participants commented about the evolution of business arrangements on farms. At one level it was noted that there are now many contractors working with farms taking responsibility for forage production, fertiliser application, and many other traditional farm activities. Further a range of quasi-employment arrangements have emerged. The major dairy farm operating structures found on New Zealand are owner-operator, share-milker and contractor milker but the last two tend to have more variation in their detail compared to 30 years ago.

It is also important to note the extent of family farm business groups. Statistical evidence suggests that more than 20 per cent of dairy farm owners own more than one farm. There is considerable anecdotal evidence of farm families and other syndicates owning multiple farms with a group owning three to ten farms not being uncommon. The precise level of group behaviour is unclear because groups do not need to publicly identify themselves and they can operate under a range of identities. Many of these groups will expand in influence, particularly in periods close to the bottom of the land price cycle.

Figure 4.5: Trend in the number of herds in each operating structure



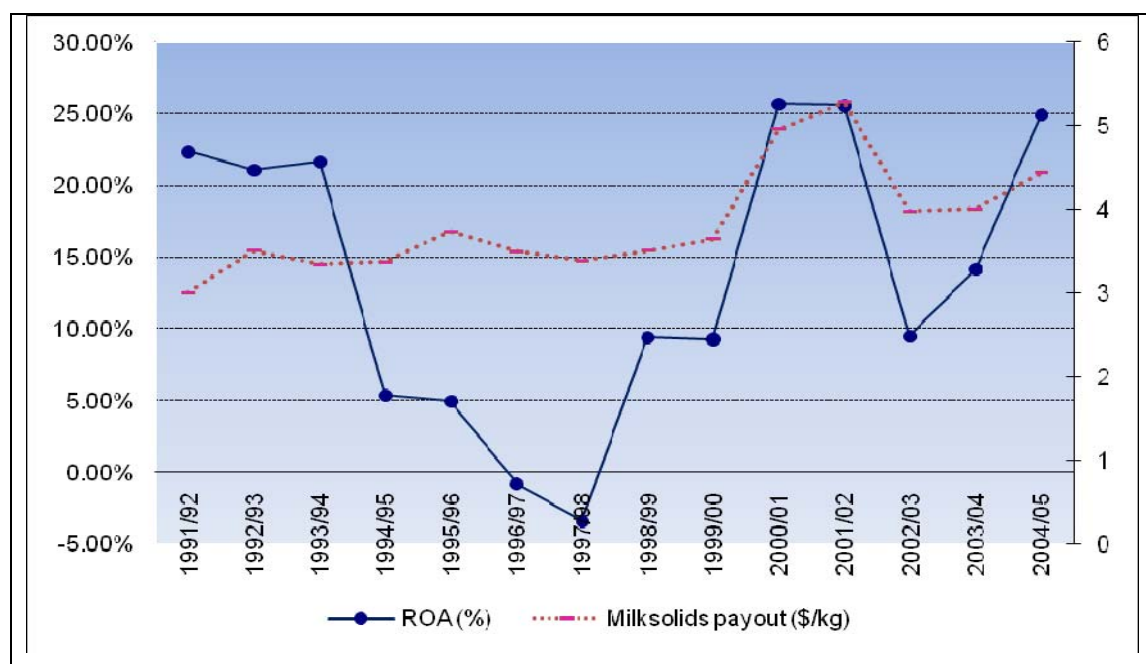
Source: Statistics New Zealand 1984/75-2005/06. Table compiled by Statistic New Zealand

4.5 Return to owner-operators and 50/50 sharemilkers

4.5.1 Return owner operator

Participants noted how farmers, sharemilkers and other participants still need to cope with significant financial fluctuations between seasons. Figure 4.6 shows the return to net operating assets for the average New Zealand owner operator farm ranged 25.7 to -3.4 per cent.

Figure 4.6: Profitability vs. payout (\$ per Kg milksolids)-owner operator



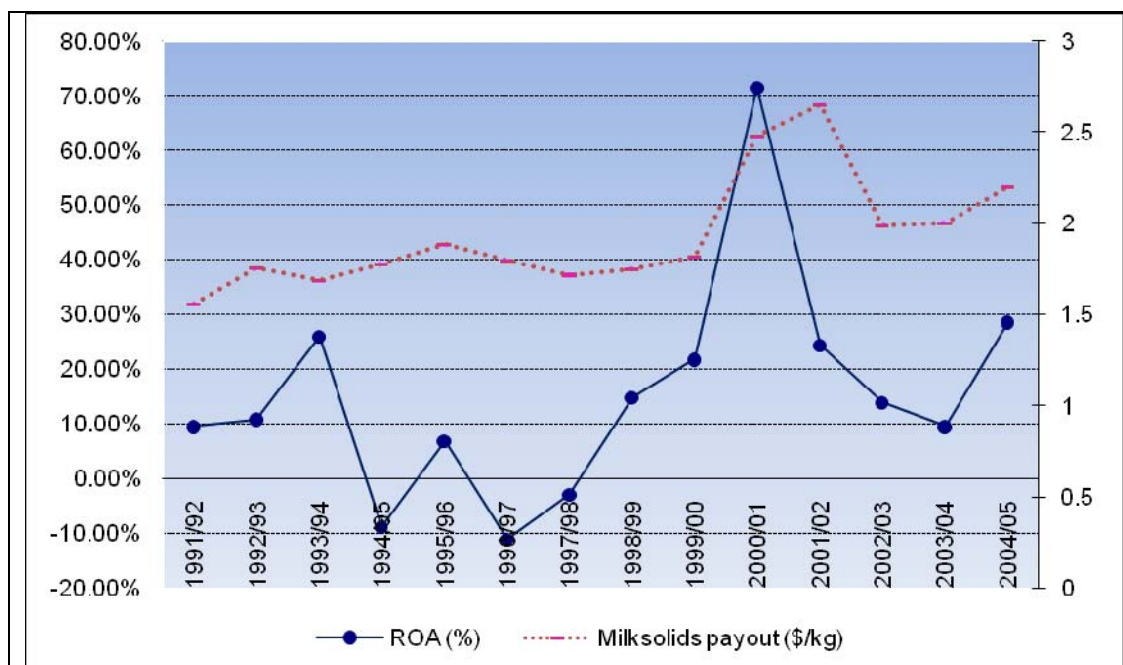
Source: Economic Survey of New Zealand Dairy Farmers, 1991/91-2004/05¹

¹ Not able to get consistent data prior to 1991//92 to compare with data between 1991/91 and 2004/05

4.5.2 Return to 50/50 sharemilkers

In a manner not dissimilar to owner operators, sharemilkers experienced significant variation in the return to net operating assets with these returns varying from 26 per cent to a low point of -11.10 per cent.

Figure 4.7: Profitability vs. payout (\$ per Kg milksolids)-50/50 Sharemilkers



Source: Economic Survey of New Zealand Dairy Farmers, 1991/91-2004/05²

4.5.3 Returns across the sector

It is important to note that across the sector are very sensitive to two factors. These are the capital structure of the farm entity and the efficiency of production. Farms that carry high debt loads end up with high interest payments per kilogram of milk solids. Less efficient producers of milk end up with high farm working expenses per kilogram of milk solids. Farm debt and farm efficiency are strongly linked to the capability of the farmer/manager and the stage in the individual business lifecycle.

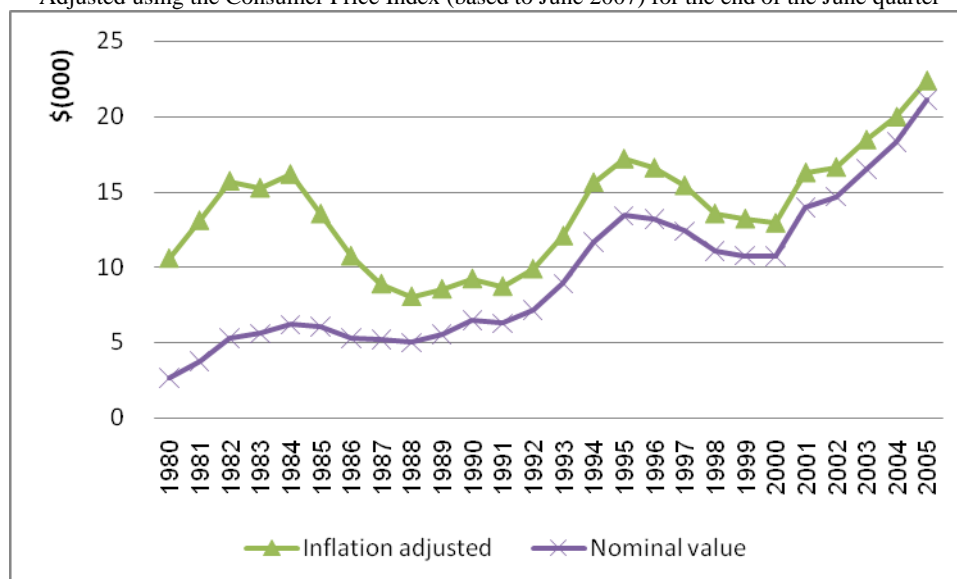
4.5.4 Trend in dairy farm sales values

Farm land prices reflect the expectations of farmers and other investors as to industry prospects. In real terms land prices decreased from 1984 and did not return to those levels again until 1995. This turned out to be another peak and prices declined again until 2000. However, since then they have steadily increased reaching their highest levels in real terms. Participants noted the importance of equity partnerships being important in facilitating asset purchases. Some participants noted the importance of farm families and others the importance of silent city investors. Recognition of the business cycle is important for investors and repeatedly a small proportion of investors have been willing to overextend themselves when the market has overheated and left themselves exposed when these prices cannot be sustained. Likewise the price of dairy cattle fluctuates significantly and provides additional risk.

² Not able to get consistent data prior to 1991//92 to compare with data between 1991/91 and 2004/05

Figure 4.8: Trend in dairy land value (\$/hectare) since 1980

Adjusted using the Consumer Price Index (based to June 2007) for the end of the June quarter

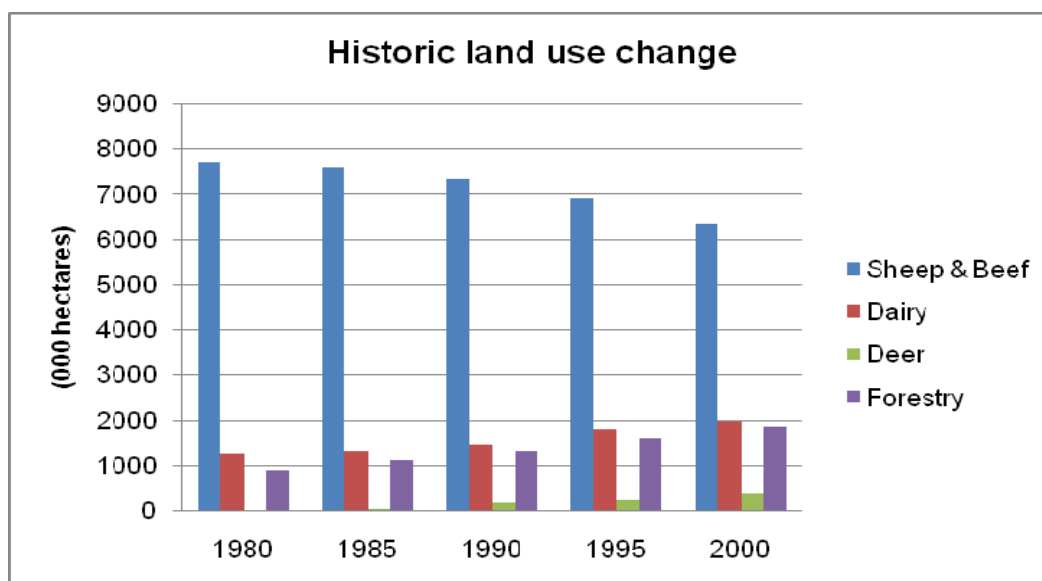


Source: LIC, 1980-2005 [online: http://www.lic.co.nz/pdf/dairy_stats/ Accessed 19/11/07]

4.6 Farm land use

Dairy production in New Zealand has increased due to changes in land use as well as improved productivity on existing farms. This is due to returns from alternative land uses – sheep and forestry in particular have not been competitive during this period. Arguably other sectors have been adversely impacted by government policies and a changing economic environment.

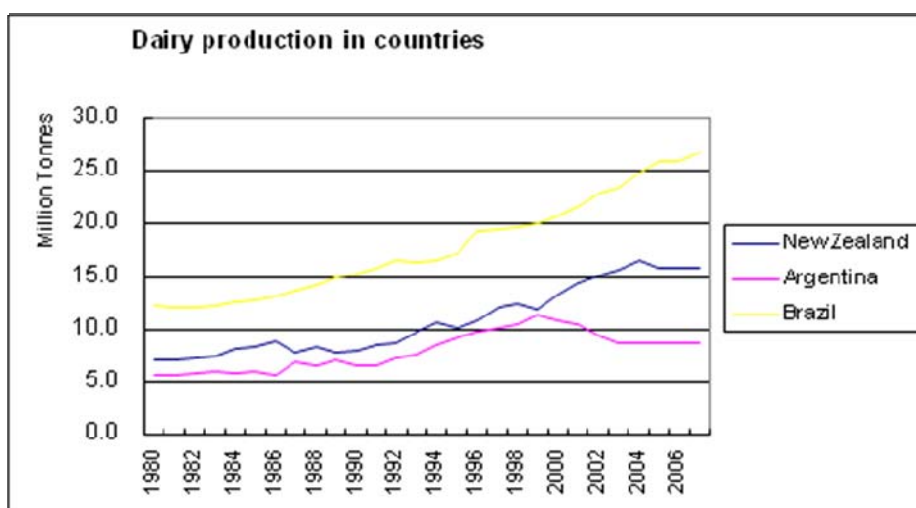
Figure 4.9: Historic land use change



4.7 Costs of production

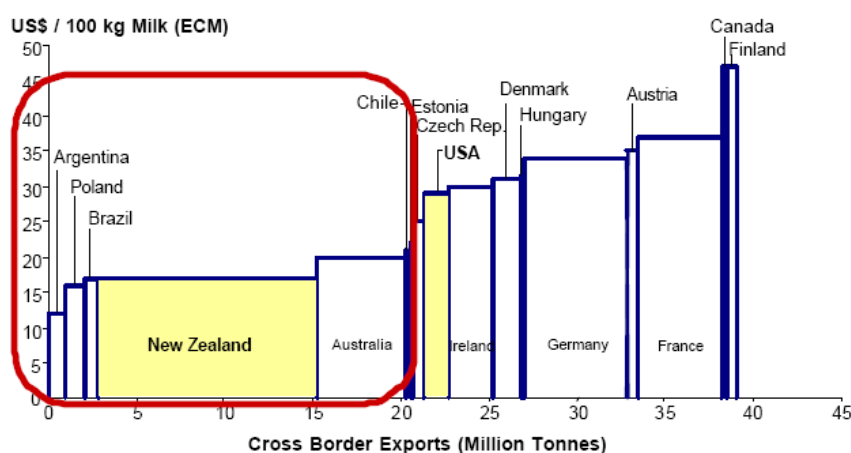
Participants noted that during the last two decades costs of production have risen in New Zealand as farmers have placed greater emphasis on volumes of production. This raises interesting questions as it has emerged that Argentina and Brazil are now lower cost producers of milk than NZ and they both have emerged as significant exporters. As seen in Figure 4.10 and 4.11, some participants are anxious about their perceptions as not being low cost milk producers.

Figure 4.10: Dairy production in competing countries



Source: Global Market Information Database

Figure 4.11: Cost and export leadership



Source IFCN Report 2004

Source: IFCN Report 2004

4.8 Adjustments in the farm sector

On farm production requires constant adaptation in response to changes in product prices, input costs, the weather and the business environment in general. These adjustments occur on a daily basis as farmers select which paddocks are grazed, what supplementary feed is provided and what equipment is acquired. The margins of adjustment are many. Participants in the interviews highlighted the following key areas as critical variables for management decision making: fertilizer applications, supplementary feed purchases, and repairs and maintenance /capital expenditures.

In addition to on farm decisions relating to animal and plant husbandry and related farm technologies farmers face ongoing choices linked to indebtedness and its costs. There has been a considerable range of funding options available from the institutions but exposure to increasing rates in some circumstances or being locked into high rates in other circumstances have been challenges to some operators.

A key adjustment challenge pertains to farmer holding of fair value shares in the cooperative. A critical decision in every season is the optimal level of production and shareholding. Historically a New Zealand dairy farmer could enhance profits by just considering the marginal production costs with the marginal revenue. Now it is imperative that the share costs are considered.

Tax management is crucial for dairy farmers. The combination of fluctuating incomes and the risk associated with reducing debt in a good season and ending up with a tax bill in the subsequent period when incomes are lower means that careful planning is important.

Profitable adjustments are driven by opportunities that make sense in the long run. However New Zealand dairy farmers start to make decisions early in any season – and prior to the season, based on initial payout forecasts and announcements. The accuracy of these forecasts is critical and where there is significant divergence between forecast and outcomes cash flows are significantly impacted. The more widespread circulation of market data such as that associated with Agrifax enhances farmer confidence in decision-making in this area.

Chapter 5

Evolution of the NZ Dairy Manufacturing Sector

Participants had much to say about the evolution of the manufacturing sector. The discussed concepts (e.g. value chain management and governance), activities and events (eg merger of cooperatives), organisational changes and associated leadership, conflicts and cooperation as noted in the three boxes below:

Participant Comments about Industry Strategy

- The importance of the NZDB strategy for the period it existed
- The difficulty for manufacturing cooperatives to collaborate with the NZDB in developing brands and markets around the world
- The difficulties of having an industry strategy when so many organisations are involved
- The different factors which led to the formation of Dexcel, Dairy Insight, Dairy 21 and DairyNZ

Participant Comments about Industry Structure

- The significance of amalgamation of manufacturing cooperatives with their numbers decreasing from 52 in 1980 to 7 in 1990 having already contracted from 250 in 1920, 200 in 1955 and 100 in 1970
- The formation of Fonterra out of the NDB, NZ Dairy Group and Kiwi Dairies and the associated business, political and people challenges
- The debates about the efficacy of NZDB payment mechanism to cooperatives and their impacts
- The challenge for cooperatives to establish appropriate share values and sustain them through time
- The impact of shocks such as the Edgecumbe earthquake and its impact on the optimal set of processing facilities

Participant Comments about Industry Conduct

Competing to control NZDB and the Kiwi/NZDG race once legislation had defined Board ownership

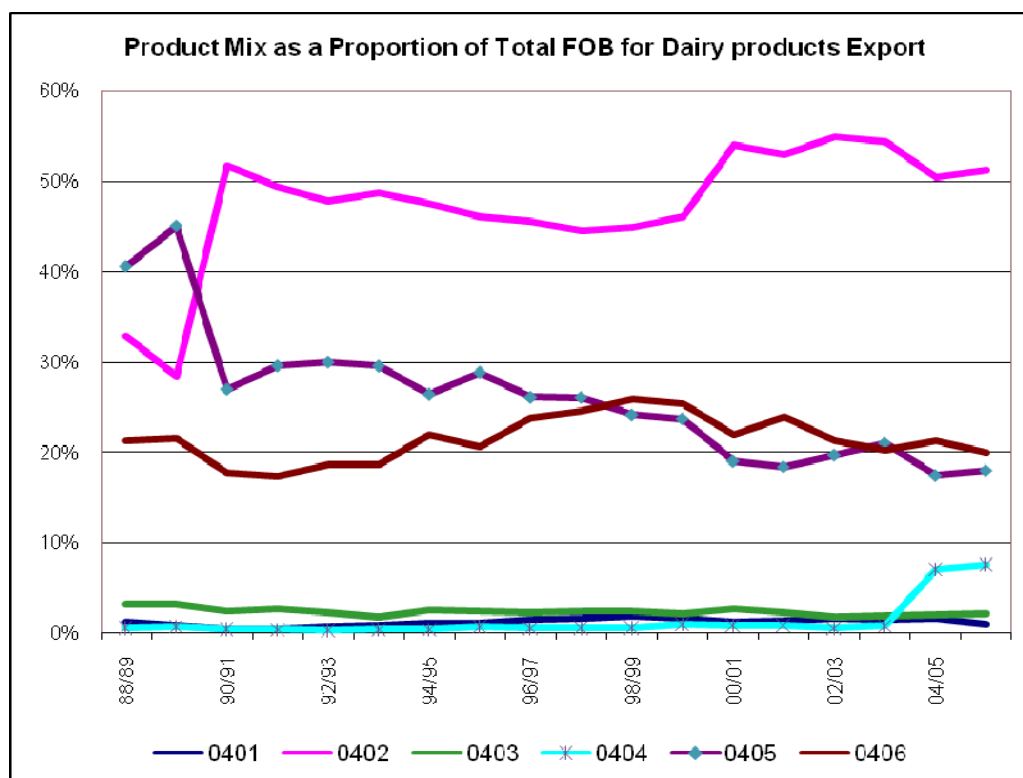
Changes at the factories involving products and processes

- Consolidation of sites
- Driving out costs as with fewer products
- Value adding activity
- Advanced use of IT

Powdergate and the pressures that led industry executives to break the law

Participants indicated they believed the New Zealand dairy industry has been successful at diversifying its product range, and constructing an international reputation as a leading edge supplier of dairy products. Statistics are available for milk and cream (both concentrated and not concentrated), buttermilk, whey, butter, cheese and curd, and other specialist dairy items. Over the last two decades dairy production has diversified away from butter and cheese toward a greater proportion of whole-milk powder. As shown in Figure 5.1, these changes have been driven by developments on both the demand and supply side.

Figure 5.1: Product proportions of total FOB dairy exports



Source: INFOS Database New Zealand

Notes:

- 0401 - Milk and cream; not concentrated nor containing added sugar or other sweetening matter
- 0402 - Milk and cream; concentrated or containing added sugar or other sweetening matter
- 0403 - Buttermilk, curdled milk and cream, yoghurt, kephir, fermented or acidified milk or cream, whether or not concentrated containing added sugar, sweetening matter, flavoured or added fruit or cocoa
- 0404 - Whey and products consisting of natural milk constituents; whether or not containing added sugar or other sweetening matter, not elsewhere specified included
- 0405 - Butter and other fats and oils derived from milk
- 0406 - Cheese and curd

5.1 Dairy product category

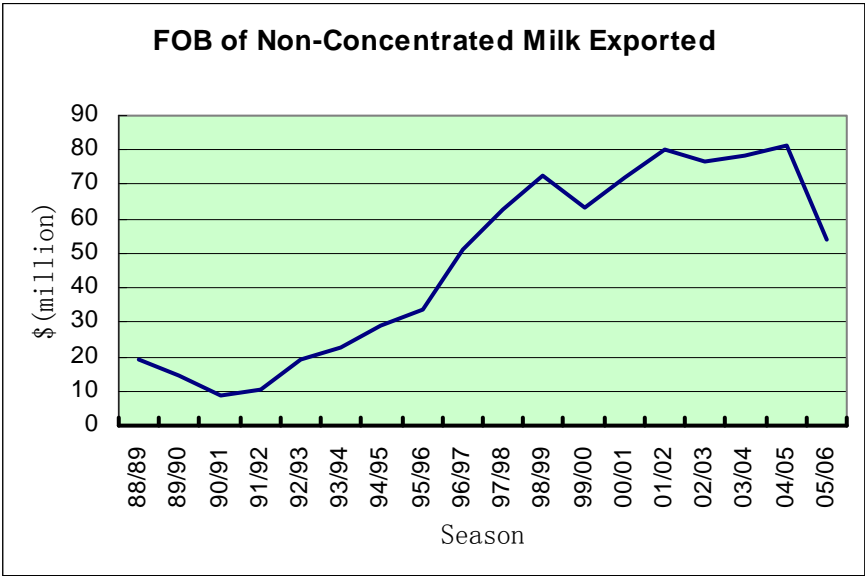
0401 - Milk and cream; not concentrated nor containing added sugar or other sweetening matter

As Figure 5.2 illustrates, over the past two decades, the dairy sector recorded a remarkable growth in FOB value for Non-Concentrated milk exported between 1990/91 and 2004/05, from \$8.8 million to peak at \$81.6 million.

The average revenue gradually dropped from 1.83 \$/kg to 1.10 \$/kg (between 1988/89 and 1996/97), then experienced a rise until 2000/01 with 1.45 \$/kg (much lower than the value in 1988/89) (Figure 5.3). One of the reasons for a decline in non-concentrate milk products exported driven by the appreciation of the New Zealand dollar during that period.

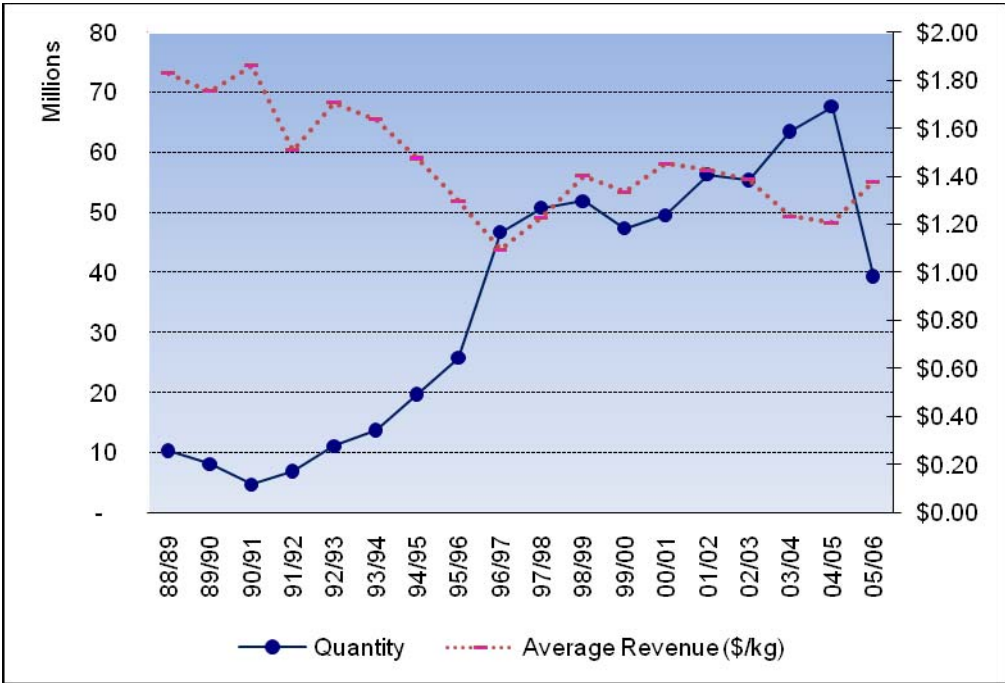
0402 - Milk and cream; concentrated or containing added sugar or other sweetening matter

Figure 5.2: Value of non-concentrated milk exported



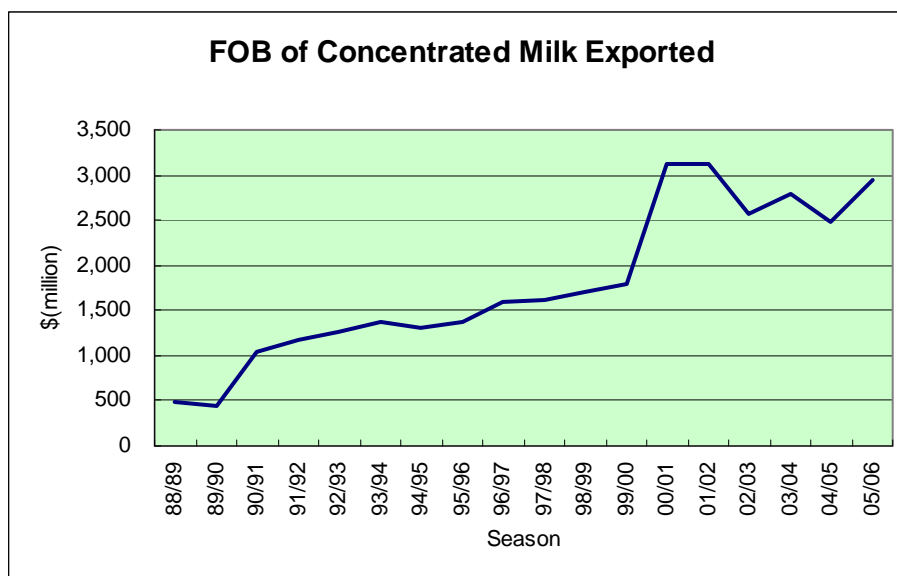
Source: INFOS Database New Zealand

Figure 5.3: Quantity and average revenue of non-concentrated milk exported



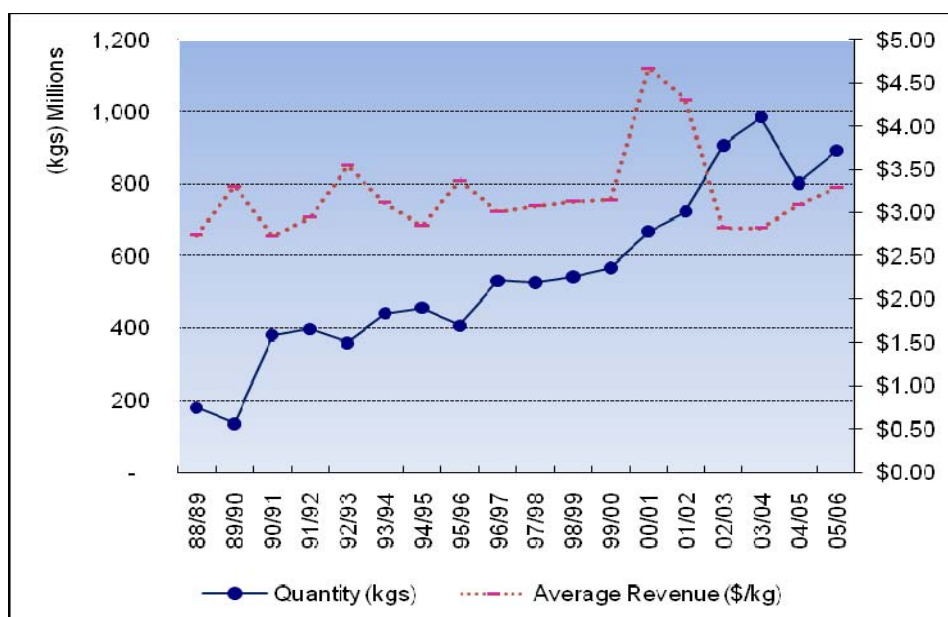
Source: INFOS Database New Zealand

Figure 5.4: Value of concentrated milk exported



Source: INFOS Database New Zealand

Figure 5.5: Quantity and average revenue of concentrated milk exported

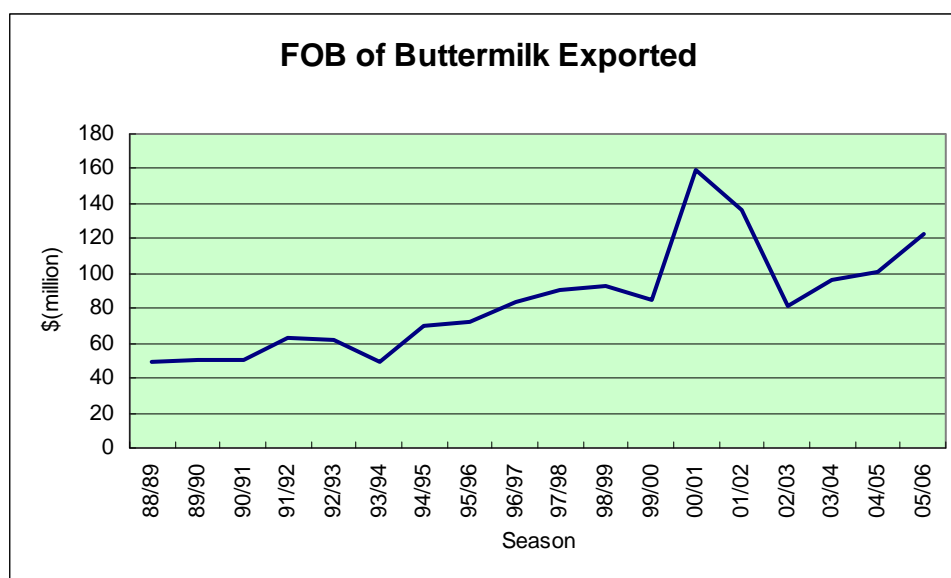


Source: INFOS Database New Zealand

In regard to Figure 5.5, the volume of concentrated milk exported increased from 179.7 kgs (million) in 1988/89, to peak 985.2 kgs (million) in 2003/04. It then experienced a decline on the following season, with 801.2 kgs (million) exported to the global markets.

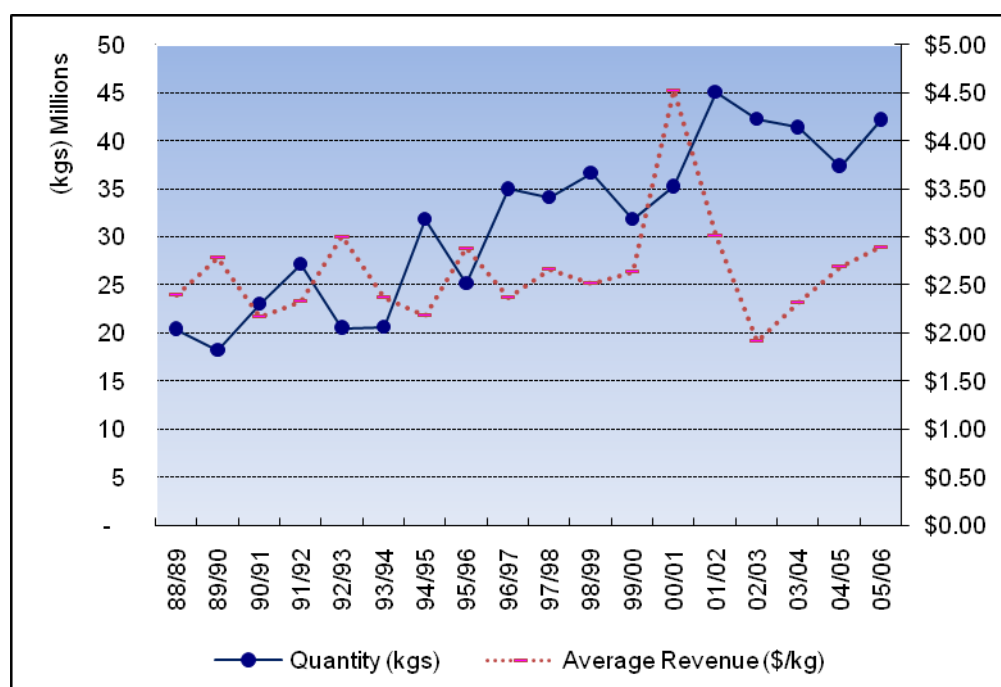
0403 - Buttermilk, curdled milk and cream, yoghurt, kephir, fermented or acidified milk or cream, whether or not concentrated containing added sugar, sweetening matter, flavored or added fruit or cocoa

Figure 5.6: Value of buttermilk exported



Source: INFOS Database New Zealand

Figure 5.7: Quantity and average revenue of buttermilk exported

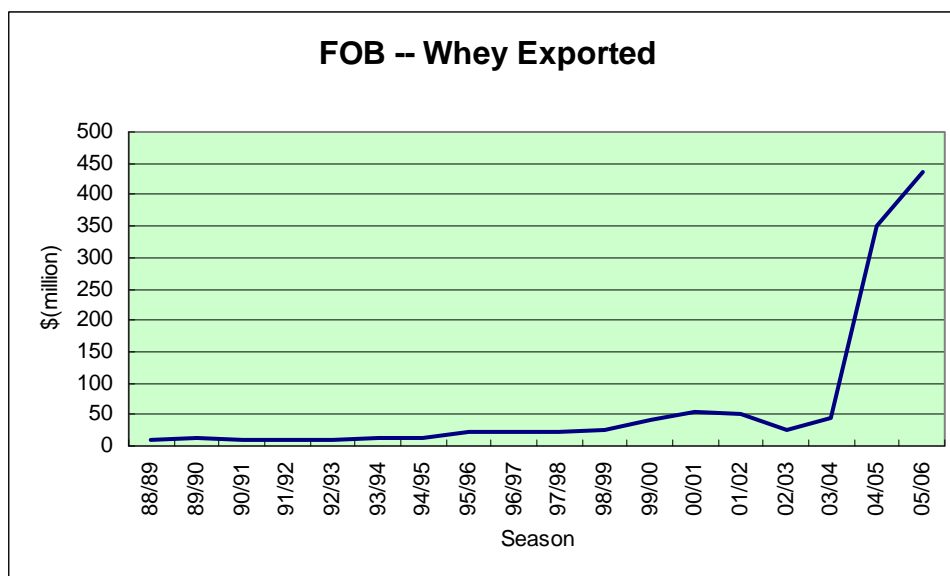


Source: INFOS Database New Zealand

Over the past two decades, the product value and volume of buttermilk exported has increased substantially, but it is still a small proportion of dairy products exported in the global market when compared with others. The average revenue of buttermilk exported has fluctuated around 2.5 \$/kg.

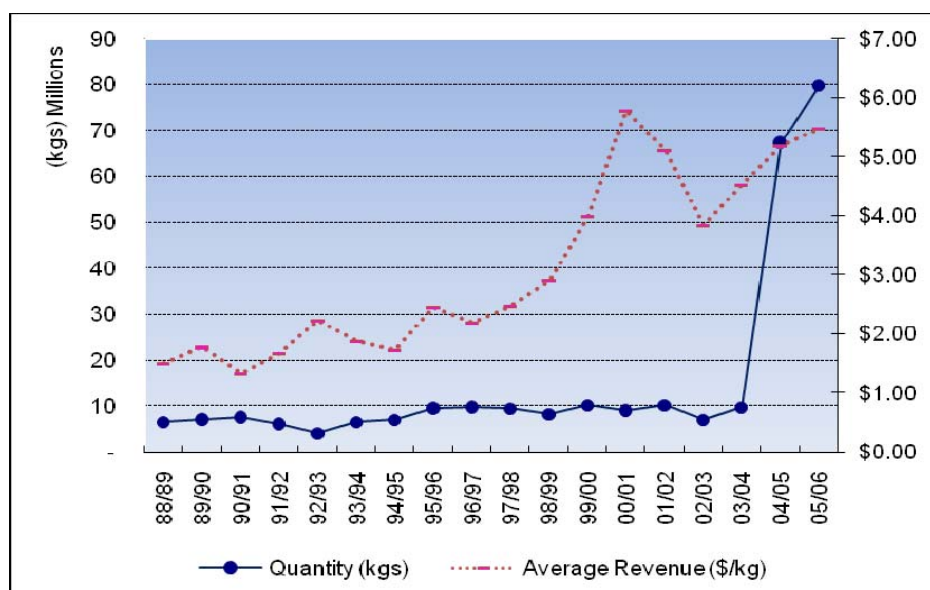
0404 - Whey and products consisting of natural milk constituents; whether or not containing added sugar or other sweetening matter, not elsewhere specified included

Figure 5.8: Value of whey exported



Source: INFOS Database New Zealand

Figure 5.9: Quantity and average revenue of whey exported



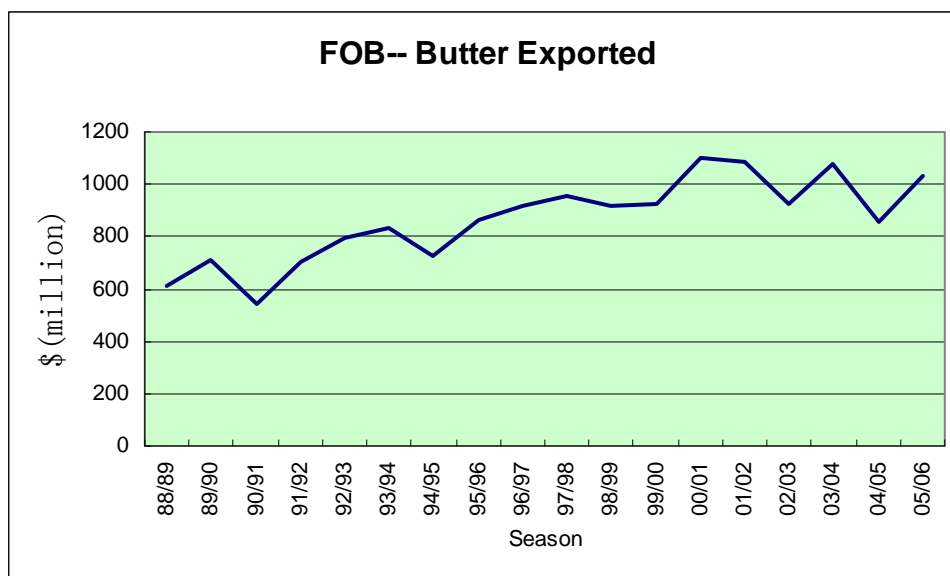
Source: INFOS Database New Zealand

In terms of export, 79,626,031 kg of whey and related products were exported in 2005/06 season with a value of \$436.5 million FOB. Figure 5.8 shows the value of whey exported slowly increased between 1988/89 and 2000/01 but has subsequently increased rapidly.

The increase from 2001/02 onwards can be attributed to Fonterra successfully marketing whey protein in Europe, North America and Japan by targeting niche sports beverage companies (New Zealand Trade & Enterprise, 2007).

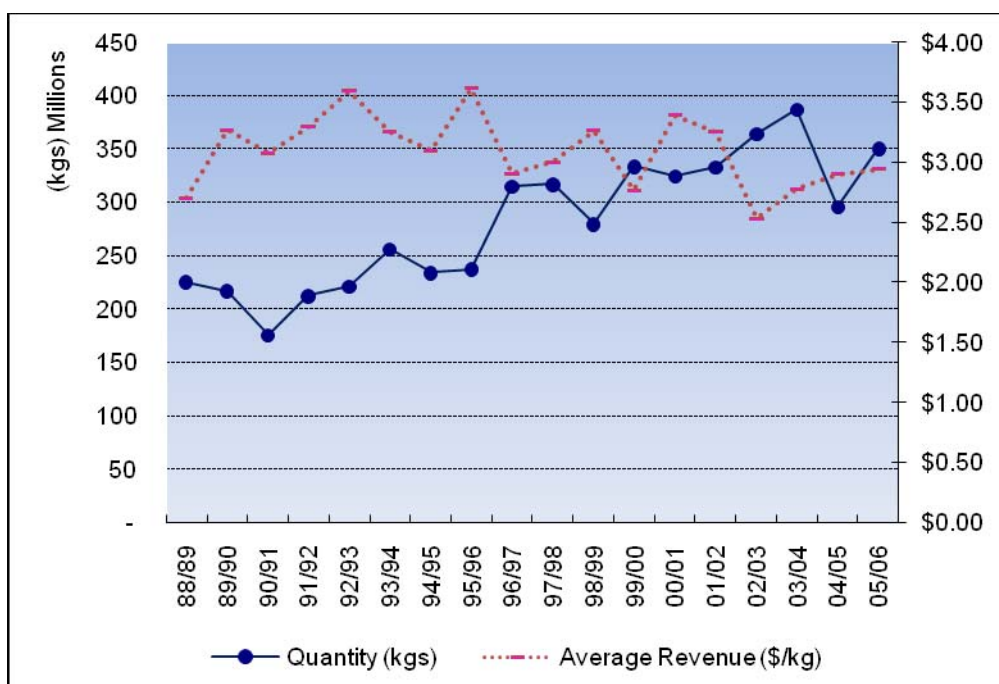
0405 - Butter and other fats and oils derived from milk

Figure 5.10: Value of butter exported



Source: INFOS Database New Zealand

Figure 5.11: Quantity of butter exported

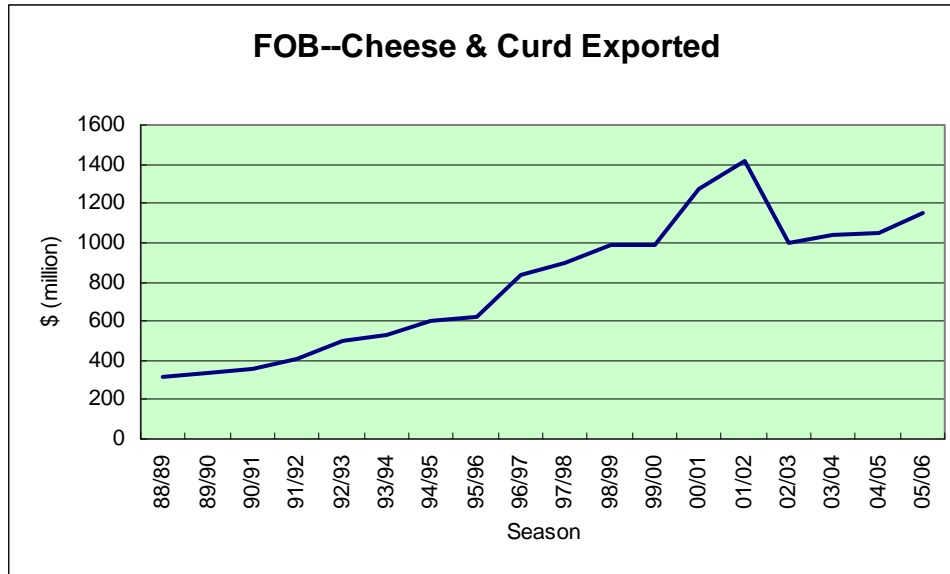


Source: INFOS Database New Zealand

The quantity and FOB value of butter exported has shown minimal variation with slow increase over the past 18 years. In 2000/01 season, the value of butter exported peaked at \$1,102.6 million.

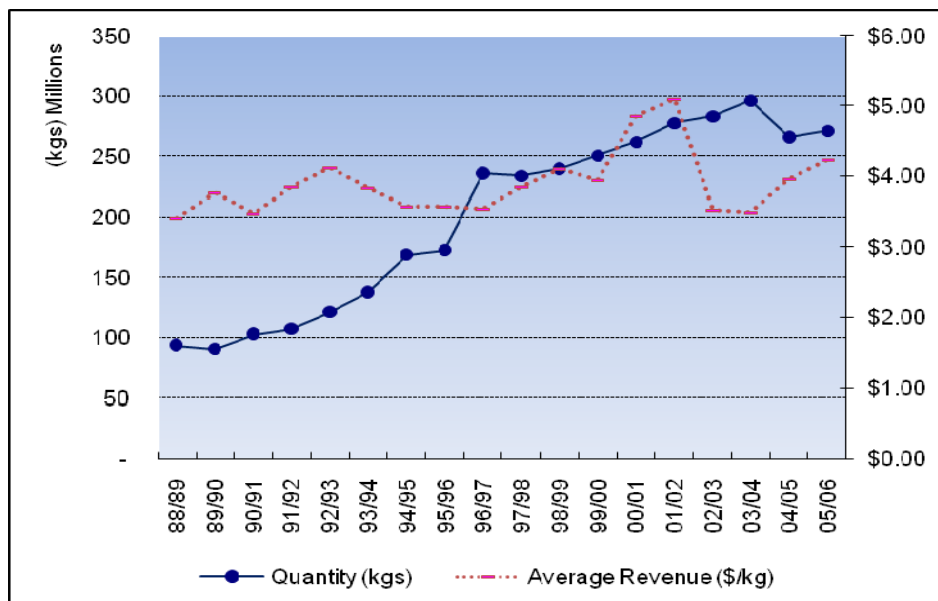
0406 - Cheese and curd

Figure 5.12: Value of cheese & curd exported



Source: INFOS Database New Zealand

Figure 5.13: Quantity and average revenue of cheese & curd exported



Source: INFOS Database New Zealand

The product value of cheese and curd exported has seen significant growth from \$319.8 million in 1988/89 season to peak at \$1417.3 million in 2001/02 season. Cheese and curd as a proportion of the total kg exported has also grown over this period as shown in Figure 5.12. In terms of export volume cheese and curd has shown steady growth over the past 18 years.

Chapter 6

Evolution of New Zealand Engagement in International Dairy Markets

A broad range of opinions were put forward by participants in relation to engagement in international markets. The comments made were influenced by the context of developments that have occurred through the period. There is less than unanimity expressed on most matters, but nevertheless, considerable agreement on key planks in the discussion:

Success categories	Indicator of success	Successful outcomes
Market access and development	Expanding markets (countries & products) Product penetration Joint venturing Doha round success Greater entry to high value markets	Higher export prices Larger export volumes More optimal product mix
Overseas capacity development, acquisitions, alliances		Increased stability
R&D institutions	Diversified genetic pool A1 & A2 developments	Higher productivity
Collective action	Lower regulation Capital structure accord	Higher margins Increased stability

6.1 International dairy market

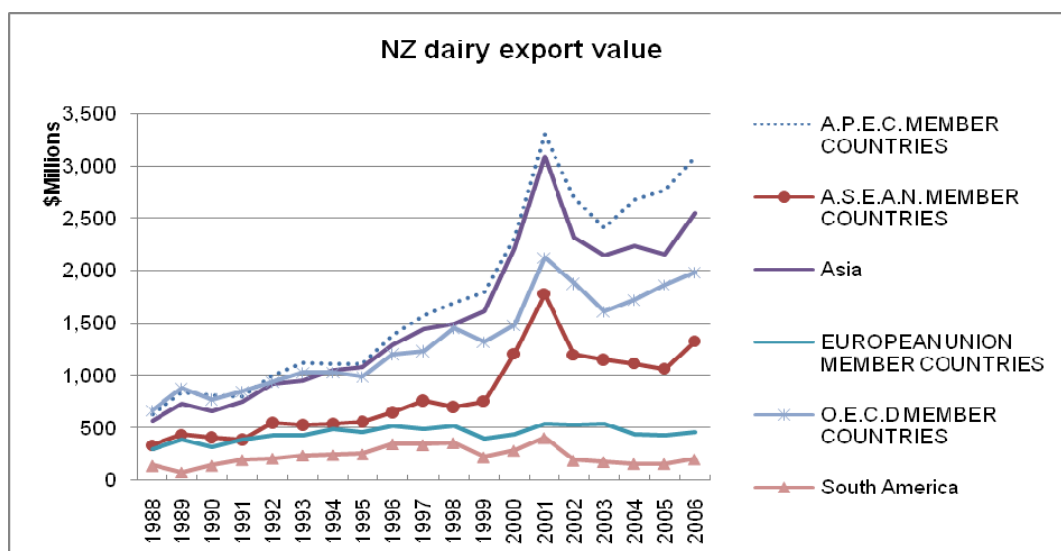
Throughout the period the international dairy market was relatively small compared to global production. It represented approximately 5 per cent of the total supply of milk with the remaining 95 per cent being produced and sold on domestic markets, often at prices above those ruling in the international market. Many governments protect their domestic producers with import levies, quotas and other trade barriers

However, the New Zealand dairy industry is unique as its domestic markets are open to world traders, with no tariffs or quotas, and also there are no subsidies or other government assistance either for home production and sales, or for export sales (New Zealand Dairy Board, 1988). In addition, cyclical supply pressure has been a regular feature of the international dairy trade. The New Zealand dairy industry was the only dairy industry in the world whose producers profitably survived purely on the returns obtained from the international market by keeping its internal costs to a minimum and by the industry protecting itself by building up cash returns at times of better prices (New Zealand Dairy Board, 1984).

Although the European Community exports half of the total dairy production, its dairy products were exported through a number of agents. On the other hand, in 1980s, with a few very limited exceptions, all New Zealand dairy exports were marketed by the New Zealand Dairy Board which was the largest single actor in international dairy trade (New Zealand Dairy Board, 1988).

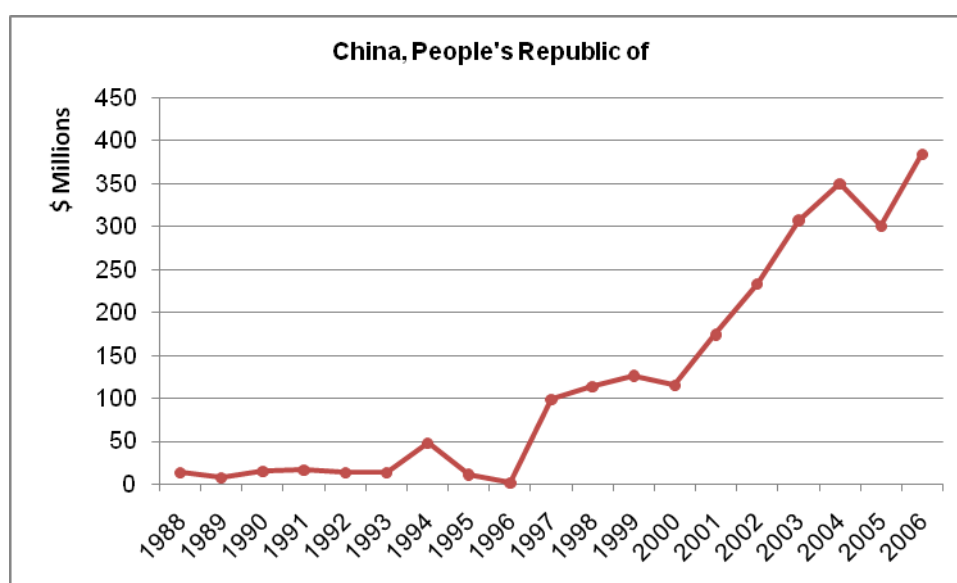
In recent years, rationalisation and consolidation through mergers, acquisitions and strategic alliances is now a common feature of the global dairy industry (Organisation for Economic Co-operation and Development, 2002). The driving forces for the development of the international dairy industry include economies of scale, increased competition for raw material, internationalisation, changes in companies' formal structures and the desire to capitalise on the favourable market prospects (Organisation for Economic Co-operation and Development, 2002).

Figure 6.1: FOB of exports dairy products



Source: INFOS Database

Figure 6.2: Value of exports dairy products-people's republic of China

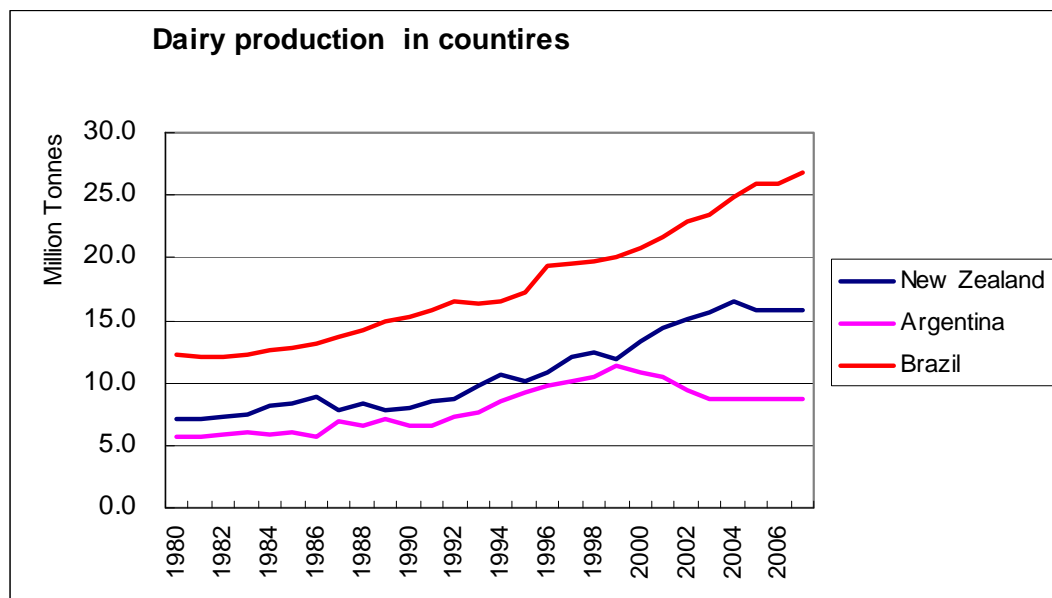


Source: INFOS Database

6.2 Competitor profile

If the Doha Round of World Trade Organization (WTO) negotiation is successfully completed then it is likely to bring substantial changes in international dairy markets. In this scenario, the significant reduction on tariff and phasing out export subsidies which was proposed in the Doha negotiations is likely to create notable shortages in global dairy markets (Fuller & Beghin, 2006).

Figure 6.3: Dairy production in countries ³



Source: Global Market Information Database

6.3 Market access and development

This remains a key concern to farmers who in part are driven by a concern that the good times could not keep rolling. The potential growth in the Asian markets is seen as a key success factor although the type of product mix and the potential for protectionist policies fostering home based production is recognised. Bilateral free trade arrangements are viewed positively as providing greater certainty in access.

The potential for joint venture production is viewed favourably but more reticence is reflected around the potential for joint venture farming in Asian countries. Herd types and practical issues appear less important than the notion of farming in Asia.

Traditional markets, protectionist policies and the potential for non-tariff restrictions such as food miles are seen as concerns. US protectionism and limited likelihood of trade agreements allowing a more even playing field access to North America is seen as problematic. The potential to product in the American free trade zone was not highly noted.

³ Dairy production in 2007 are estimated (implied for all countries)

6.4 Product development

The possibility for higher value added while continually talked about does not seem to be translating into the profit mix. While there are niche companies established to go for the high end value add component such as Open Country Cheese, it appears they have not pursued that agenda and tended to focus on a base load of basic cheddar. The commoditisation versus refinement of product appears an open concern.

6.5 Distribution

Further concern was expressed about ensuring access to markets than discussion about distribution channels. The potentially growing power of retail groups such as large scale supermarkets is not something that appears to be widely appreciated by farmers and is more the prerogative of industry leaders.

6.6 Branding and image building

The value of brands, the life cycle of brands and the costs of brand maintenance are seen as problematic. The tension between commoditisation and consumerisation remains an unresolved issue. There has been a reduction in brands over time and whether these are an essential component of market penetration and growth or whether generic “home brands” will work as well, remains open.

6.7 Overseas capacity development, acquisitions, alliances

There is a split view between the merits of getting involved in offshore acquisitions and more conventional exporting. The industry has a clear strategy of being dominant or at a minimum very significant in terms of influencing the flow of goods in world trade. The buy-in associated with the approach is not total and in large appears to reflect attitudes of farmers to risk taking.

6.8 R&D institutions

The commitment to R&D remains high. There appears to be elements of capture in this area with tensions between the largest producer and the directions of the research bodies. The merger of Dexcel and Dairy InSight may produce synergistic gains or may result in further centralisation of control by Fonterra. The area of genetic improvement and evolution of a New Zealand herd dominated by U.S. originating genes reflecting little diversity for regional differences in climates is potentially problematic. The cost driver solutions may not necessarily work to the long term advantage of the industry. Issues concerning A1 and A2 remain open and divisive.

6.9 Collective action

Collective action is at the root of the co-operative nature of the industry. This unity which appears to have afforded advantages as a structure compared to some other rural based industries did have its pluses and minuses. The collective action appears to be strengthened when responding to external pressures such as a perceived threat like emission taxes. However, the collective action of farmers may also thwart the initiatives of industry segments such as the planned capital restructuring proposals.

Chapter 7

Summary of Critical Success Factors and Conclusions

Participants have a diversity of views about industry success and what causes the success. A provisional categorisation of their responses is noted below:

Success categories	Indicator of success	Successful outcomes
Farm profitability and farmer wealth	Farm profit EFS/ha MS/ha Total shareholder return	Improved farmer skills Technological improvement including genetics, irrigation, Nitrogen, labour saving technologies, Management fits climate Effective Science investment in 1960s /70s Exploiting lack of success by other land based industries
Manufacturing industry success	Manufacturing costs	Improved Technology Improved Pricing regimes Economies of scale and scope Effective science investment in 1970s/80s
International Marketing Success	Market returns	Legislative support Effective connections to market demand Reduced global subsidies
Future Industry success	Stable ownership structures New product development New market development	Robust governance Clever investment
Societal success	Politicians that listen to industry Vitality of rural towns Executive incubator	Educated and committed leaders Improved communication and negotiation

Participants' views are based on interpretations of a wide variety of events through the period. Their comments and other sources provide a lens on the evolution of the industry though this period.

7.1 The period 1980 - 1992

During the initial part of the period the NZDB was a monopoly exporter from NZ with a strategic mandate to maximise milk returns received by dairy farmers through global marketing actions. Its strategic objectives during the 1980s were to:

- Develop and market more specialised dairy products which could be sold at a premium worldwide.
- Increase customer responsiveness shifting specialty products manufacturing to subsidiaries.
- Establish product development, processing and packaging facilities in major export markets.
- Engage co-operative in development and production of specialty products.
- Improve communication between co-operative, NZDB product divisions and subsidiaries.

The predominant driver in the industry during the 80s and until the mid 90s was the need to sell all the milk that NZ produced with minimal carry-over of inventory to the following year. This need dominated the psyche of the dairy industry and was probably grounded in Britain joining the EEC in the 1970s.

Prior to the study period, the NZDB had established itself as a multinational marketing organisation. It operated through 80 overseas subsidiaries and joint ventures established in 30 countries and marketing products to more than 100 countries. The Board acquired private dairy food distributors and engaged in joint ventures to forward integrate in major export markets. This enabled the NZDB to acquire local knowledge. Investments in subsidiaries increased from NZ\$19 million in 1980 to NZ\$414 million in 1988. These included Dorman/Roth, the largest importer of European cheese into the US, Anchor Foods in UK, and subsidiaries in Latin America, Southeast Asia and Japan. The rationale for such structures was to allow for closer relationships to markets and customers and for a more efficient transfer of marketing intelligence back to New Zealand. This facilitated responsiveness and product development.

In 1988, 80 per cent of the subsidiaries sales were generated from milk produced in NZ. In the US the Board engaged in research joint ventures to develop immunological products, animal health products and poly oils from milk. It operated the largest dairy processing complex in Southeast Asia in a JV with Singapore's largest retailer.

The Board was structured in product divisions. Each product division was responsible for coordinating development, marketing and production of their category of dairy products. The central research facility of the dairy industry (the Dairy Research Institute), was largely controlled by the Board but also benefitted from independent directors. It was responsible for fundamental research, product development and technical assistance to the co-operative. The Board also operated R&D facilities in the United States, the UK, Singapore and Japan.

The single desk exporter status of the NZDB provided the New Zealand dairy industry with marketing economies of scale and many will argue market power. Yet the Board always faced the opposition of those who questioned its efficiency.

7.1.1 NZDB and payout systems

The standard cost models were first established by the NZDB in 1987, and existed in the same conceptual form until June 1998, when the commercial pricing model replaced them. Engineers and accountants belonging to the NZDB developed the standard cost models. A cost model was developed for every product that was made by the processing companies. The models included all the costs associated with producing a particular product, collection of milk, administration, and capital costs. These costs were estimated as “industry averages” for the manufacture of particular products. The models were updated regularly to reflect technological advances and other changes in the industry.

In essence, each model represented a single manufacturing site that made just the one product. The cost models were designed on industry averages and did not represent a real factory, which very likely produced multiple products that entailed joint costs. In developing the 500-odd standard cost models, however, the NZDB sought to eliminate distortions between products through the consistent application of standard costing principles to all products that the board purchased from the dairy manufacturing co-operative (Wollaston, 1995, p. 46).

On the basis of the models used to estimate production costs for each product, the NZDB “reimbursed” the co-operative according to the amounts of the various products supplied by them. The payout per kilogram of each product to each processor was therefore standard. Any surplus that the board earned was paid out to the processing companies on the basis of the milksolids provided.

The ability of a co-operative to pass on a larger payout to the farmer was determined by how efficient it was; if the co-operative could produce the goods cheaper than the average as calculated by the model, it could pass on the surplus of supplying farmers. If, on the other hand, the processing company found its manufacturing costs exceeded those estimated by the model, it had to sell product to the less-lucrative domestic market and the supplying farmer received a reduced payout.

The major co-ordinating mechanism applied by the NZDB was a payment system used to exert some influence over the product mix. An approximate approach towards matching market requirements with specific production capabilities was attempted each year through submissions from the dairy processing companies and negotiations between them and the NZDB. Proposals were called for by the NZDB from co-operative that specialised in the product required. A co-operative was then selected to produce the product based on its ability to conform to price, quality, and other technical requirements (Nixon, 1998).

The payment system had the ability to offer differentials or penalties to processing companies to encourage certain product mixes. The aim was to encourage the companies to produce the products most valued by markets at different times. Once the processing companies received their payment from the NZDB, they made a payout to the farmer based on the kilograms of milksolids provided.

The cost model system was initially helpful in providing an improved basis for payments to manufacturing co-operatives. However the system was problematic due to issues associated with average costs versus marginal costs, the pooling of revenues and additional knowledge manufacturers had relative to the Dairy Board. The use of the standard cost models has been blamed for driving manufacturing companies’ strategies towards “beating the model” and away from product innovation (Nayga, 1994). This usually entailed a focus on large runs of bulk goods instead of investments in differentiated niche products. Over time distortions

emerged and as a result the Board initiated compensating payments where they were deemed necessary.

The system was never static and changes were made as the market and production techniques evolved and all parties learnt from new information. Hence during this period the basis of payments for milk changed from milkfat content to milksolids supplied.

The co-operative ownership structure of the industry was rarely questioned though there was much debate about issues of supplier rights, share values, the optimal size of manufacturing sites and co-operatives and many other business issues. For some manufacturing co-operatives significant progress was made in enhancing their business efficiency but others found themselves with very difficult challenges such as when Tui found itself struggling to have the necessary milk collection capacity.

It should be noted that while a co-operative was obliged to collect and process all of the milk supplied by its members, it could still curtail growth in the number of its member suppliers. Thus, later in the period at least one co-operative (the Tatua Dairy Co-operative) absolutely refused to admit any more farmer suppliers, and another (the New Zealand Dairy Group) placed a moratorium in June 1999, on new milk in the lower South Island that lasted over a year. During the period, new suppliers wishing to join a co-operative had to pay a levy that represented an investment in the assets that have been built up with capital that the dairy company has previously retained from existing suppliers. The levy provides partial compensation for the costs of expanding capacity.

7.1.2 A push towards adding value

One major challenge faced by the NZDB during the late 1980's and early 1990's was how to motivate manufacturing co-operative to engage in new product development and be more market oriented without the Board losing its grip on co-ordination. Mr Gough, CEO of NZDB at that time stated that, *"here is the conundrum, how do we make the dairy co-operative more market oriented when the main marketing initiatives are taken elsewhere?"*

At the same time there was a push to get into branded fast moving consumer goods (FMCG). The motives for this were threefold. First, there was recognition that the world's consumers were moving towards buying branded products. The domestic milk market in NZ was only deregulated in the '80s and with that consumers went from buying milk in plain glass bottles to branded cartons and plastic bottles. The rise of supermarkets and pre-packaged, branded products changed traditional shopping habits. Second, owning the FMCG brands and processing facilities were perceived as providing more market security for selling NZ's dairy products than having to sell commodities to global players or in open markets. Selling to a Nestle would have been a once or twice a year negotiation. Loosing sales to someone else placed the NZ industry in the difficult situation of having to find a customer of similar buying power. It was considered that owning the FMCG brands reduced such risks. The pressure to move away from commodities and towards increasing value added products started when the UK announced it would join the EC. It was a coincidence that at the time NZ had a need for alternative markets and was having difficulties selling traditional commodities, the South East Asian countries were entering a phase of economic growth, increasing consumption, modernisation, and willing to improve nutrition; particularly nutrition of young people. The move to FMCG in South East Asia resulted in brand developments such as ANCHOR, ANLENE, and ANMUM.

7.1.3 Marketing organisation

It is interesting to note that during this time FMCG and bulk ingredient sales operation in each country of the world were run by the same people. The Dairy Board organised itself internationally purely along geographical lines and in NZ it was organised into product divisions based on the major classes of bulk dairy products (milk powder, cheese, butter and protein). There was no ability for information systems to measure the profitability of an individual sale.

NZDB purchase of a stake in Soprole in the 1980s may have been motivated by that rationale. At the time Chile was an importer of dairy products, and owning the company would have seen greater guarantees of them buying their products from NZ. Finally, for regions like Asia, that were not traditional consumers of milk products, much less of NZ dairy products, creating a FMCG business and establishing marketing subsidiaries were seen as a way of growing the overall market for NZ dairy. It was considered as very difficult to grow a market having just a position of commodity wholesaler or of a distant bulk ingredients supplier. It was believed that it is the person selling to the end customer who can most influence the growth of a market

7.2 The period 1993 – 2000

Performance by manufacturing co-operative was based on cost efficiencies. This strategy was a response to the payments system used by the NZDB and the fact that all co-operative faced a monopolistic buyer in the exporting market, namely the NZDB. Cost leadership requires cost efficiencies along the entire supply chain. At the manufacturing level, competition between co-operative drove investments in scale-efficient plants, development of efficient operational processes, and control of management costs. There were incentives in place for the co-operative to pursue tight efficient strategies. The payments system based on manufacturing costs models acted as a permanent incentive for the co-operative to monitor their costs and focus on “the model”. The NZDB provided extra financial rewards to co-operative for outstanding efficiency performance. Pressure was maintained by permanent updating of the model. Executive compensation schemes in the dairy industry were also tied to performance against targets. For example in the case of Kiwi Co-operative Dairies, 30 per cent of the salary package of the chief executive was related to the achievement of performance criteria. Economies of scale were also pursued for inbound and outbound logistics (transportation and warehousing) both in New Zealand and overseas.

7.2.1 The industry efficiency improvement study and subsequent developments

In 1994, four dairy companies commissioned an Industry Efficiency Improvement Study (IEIS) carried out by the Boston Consulting Group. This study identified that if the then 15 co-operative merged in four, an efficiency gain of between NZ\$190 million and NZ\$253 million per annum (Graham, 1996) could be achieved. That would translate to an increase of nearly 12 per cent over the base payout to farmers which at that time was of NZ\$2.90 per kilo of milksolids. In response to this opportunity a working team of NZDB and Dairy Company CEOs was formed to formulate how to capture the benefits identified by the IEIS. This became the Business Development Project (BDP) (Graham, 1998). Manufacturing costs dropped at a rate of three per cent per year in the period 1995-2000 (Leslie, 2000).

Mergers provided for reducing product-mix risk as large plants were established. Whereas the consolidation of dairy processing at a few regional sites represented strategic moves to beat the cost model and to optimise the product-mix, cooperatives also used optimisation software based models short to medium term production planning. These models informed decisions of allocation of milk in the various farming regions to factories, of daily production schedules of the various powder, casein, cheese, and butter products, and also of diversion of by-products between factories for further processing.

In the early 1990s the NZDB used a system of bonus and penalty payments to persuade the dairy co-ops to change their product mix. These payments supplemented a set of product prices that were based on average industry yields and production costs, as well as a basic milk price for the farmer.

In these final years, the Dairy Board used optimisation software to develop a monthly optimum production plan for the (up to) two billion litres that had to be processed and sold on a month-by-month basis as one of nine possible milk product categories. These categories included milk powder, casein, butter, cheese, and whey. The model took into account plant capacities, milk volume and composition, process options, market demand, finished goods requirements, storage capacities, and transport and storage costs. The Dairy Board's product-mix planner noted: "The opportunity and challenge is to match production to a global demand and global prices for each of these nine products" (Gifford, 1999). The resulting benefits were estimated to be at least about NZ\$20 million per annum.

Transportation was one of the key areas where efficiency gains were sought. A major cost in the dairy industry is the collection of milk from the dairy farms. The careful management of collection costs has become even more important, with the consolidation of processing sites. Milk has to be collected from farther away and timeliness is all-important as it is a perishable product. Kiwi Co-operative Dairies noted that a record milk volume in the 1997/1998 season resulted in a shortfall in tanker capacity and delayed milk pickup (Kiwi Co-operative Dairies Limited, 1998).

Extensive attention has been paid to tanker routing, allocation, and scheduling to reduce costs and to improve efficiency in the dairy industry. These decisions were supported on software based models like "Fleet Manager" at Westland Co-operative Dairy. Routing decisions based on Fleet Manager took 60-90 minutes compared to the manual system which took six hours each day.

Similarly, there were challenges with finished goods distribution. Due to the averaging effect of the cost model on the industry some dairy companies would send products to ports farther away than was necessary, to take advantage of transport subsidies paid out by the NZDB (Slade, 1998). To correct this supply chain problem the NZDB carried out a warehousing and port rationalisation study in 1999. With regard to the South Island, the study identified substantial cost saving in storage and inland transport that could arise if product from the eight manufacturing sites was exported through three ports instead of the five being used at the time. Comparative runs revealed that savings of up to NZ\$4.2 million (31 per cent) against 1997/1998 costs and of NZ\$7.4 million (36 per cent) for the 2002/2003 season were possible.

The consolidation of processing sites naturally results in economies of scale in processing but there were offsetting costs such as the greater cost of milk collection. Likewise, the rationalisation of ports (and warehousing) in the South Island, from five to three, increased the cost of haulage of finished goods from the eight manufacturing sites to the ports, but the

benefits from consolidation more than offset the increased cost of transport to result in net savings of 31-36 per cent (Sankaran J.K. and Luxton P. op cit). The introduction of larger milk storage tanks than previously available in remote dairy farms (The Dominion, 1997), also facilitated transport efficiency gains enabling less frequent pickups of milk from farms by road tankers.

The cost models developed by the NZDB played a vital role in providing the information required for making total-cost decisions. The models were very detailed and incorporated all aspects of logistics and operations. They provided information on a product basis that cut across functional boundaries. By having to participate in the industry cost surveys, the individual co-operative were forced to better measure their own costs, which in turn facilitated better tracking and management of the same. The repeated, as opposed to one-off, nature of the surveys, meant that the information on costs was updated regularly, which was deemed important if total-cost decisions were to be made successfully (Cavinato, 1992). The regular updating of the models also required the dairy companies to continually improve their performance.

7.2.2 Board influence on supply chain costs

During this period there was significant debate about the potential of the Board to reduce costs in the supply chain. By dealing with freight carriers and suppliers of packaging, the NZDB could negotiate more favourable rates than would have been possible if each co-operative had independently negotiated the procurement of goods and services with suppliers. Thus, through strategic alliances with two packaging companies, the board expected to make significant gains.

Similarly, with regard to freight, the NZDB, by virtue of the volume of exports that it represented, was able to persuade shipping lines to call on ports that were desirable from the view point of its supply-chain optimisation programme. The board was NZ's largest shipping account, with over NZ\$260 million in sea freight billings for its 1.3 million export tons in 1997/1998 (Hunter, 1999). The global supply-chain director of the NZDB conceded the board used its volume to leverage service, efficiency, and price with transport providers (Clarke, 2001).

Another example of NZDB-led initiatives that benefited the entire supply chain was the introduction of the global information technology (IT) package that was commonly referred to as the "cow-to-customer" project. The goal of the project was to tie the farmers, dairy companies, and export customers into a common system (Jackson, 1997). The NZDB's plan was to have all of its subsidiaries, numbering over 90 worldwide, use a unitary, global system. Up until then, international subsidiaries had made individual decisions regarding information technology. The project would eliminate many non-value-adding activities in the supply chain, such as the duplication of order processing; a major goal of the project was to be able to pass on orders from the consumer directly to the dairy factory, which then filled the order.

7.2.3 Marketing strategy

The second period started at the end of 1992, when Mr. Warren Larsen was appointed CEO of the Dairy Board, and lasted until Fonterra was formed. At that same time Mr Pryme Footner was appointed CEO of the NZ Dairy Group and Craig Norgate was General Manager of Administration at Kiwi. The leadership provided by these individuals is considered a key

driver in this period. The operating environment for the dairy industry in general and for NZ in particular, was changing rapidly at this time and what strategies there were tended to be largely reactive to this. Some key environmental changes were occurring at that time.

First, the appointment of three new CEOs along with consolidation of the manufacturing dairy companies (there were only 15-16 by this time, following consolidation for 70 years or more). That meant that the leadership of the industry was now a matter of contention. Historically, the NZ Dairy Board had been seen as leading the industry but this was no longer so accepted by the now more powerful consolidated co-operative. This added tension into the operations of the industry and also led to growing political pressure for change.

Second, the FMCG developments were starting to reach a level of maturity that demanded a different management approach. The industry had had a couple of major successes in innovation with the development of Calcium enriched milk (Anlene - 15 years later still a key platform for the FMCG business) and spreadable butter (which at the time looked like a huge development although seemingly not as much lately).

Third, through the 90s the international market regulatory environment was signalling changes. The Uruguay GATT round in particular was significant in 1995. For the first time the industry started to move from a focus on "how do we sell all our milk" to "how do we maximise the value of our sales".

Fourth, global pressure was starting to bear upon State Trading Enterprises and the single seller status granted to the NZ Dairy Board was starting to become more and more problematic. The key results of this were that FMCG and added-value strategies were starting to be pushed harder.

A data warehouse was implemented around 1995 to start measuring profitability on a product by product basis and the Dairy Board went through a series of restructurings from 1994 through to 1998 which saw the NZ head office move from Product Divisions, organised around classes of dairy commodities, to functional divisions (marketing, operations/logistics, finance), and later the global operation were reorganised into a commodity/ingredients business and a FMCG/consumer business.

Participants suggested that innovation became a high priority in Warren Larsen's days during the 1990s and until he departed when Fonterra was formed in 2001. Warren as chief executive of NZDB was considered a great champion of innovation and believed that existing structure was not conducive to enhancing innovation. He was responsible for setting up a specialty ingredients division and a FMCG consumer division, recognizing that those were strategic business units. Previously those units were just undifferentiated in the structure.

7.3 Governance structure

This significant reduction in the number of manufacturing cooperatives along with the move to FMCG and added-value strategies, and leadership tension in the NZ industry, put increasing pressure on the ability of the manufacturing dairy companies and the marketing business (NZ Dairy Board) to work effectively. To the extent that the FMCG and added-value strategies relied on product innovation the structural separation and artificial interfaces between the manufacturing and marketing were starting to be seen as more problematic.

The ownership of the NZDB at the time was not legally defined. The NZDB existed under Government legislation, suppliers of dairy products for export were required to put in capital but their shares conferred only limited rights. Under the NZDB Act the rights of owners were only really defined if the NZDB were to cease functioning. While it remained an on-going entity, ownership was less clear. The industry worked together to amend the Act in 1996 and the main effect of this was to confirm that the manufacturing dairy companies were the owners of the NZDB based on the product they supplied to it. This exacerbated leadership tensions in the industry with two of the manufacturing dairy companies appointing their CEOs as Directors of the NZDB. It is considered that this move was not taken too kindly by the then NZD CEO. Also the NZ Dairy Group (as 60 per cent owner of the NZDB) consolidated the NZDB accounts into its own financial accounts, which although required by accounting standards, was still giving the impression that the Dairy Board was now a subsidiary of it.

In this context in 1995 the industry underwent the first analysis and debate on the benefits of merging the entire industry into one large company. Feelings at the time were mixed. The medium sized dairy companies were the key proponents because their size had them trapped in “no-man's-land”. The small, niche companies, were less concerned. The large dairy companies saw they could do well on their own anyway. By 1998/99, the industry had consolidated to the point the Kiwi Cooperative and NZ Dairy Group represented 95 per cent of the industry and only Westland and Tatua stood out as niche players.

An industry strategy prepared in 1998 by McKinsey & Co added to all this with the underlying premise that the industry needed to transform from being a manufacturer and marketer of NZ produced milk and milk products and become a truly global dairy company, exploiting its areas of expertise wherever it could. A key recommendation of that strategy was that the industry needed to resolve its structure as it was increasingly recognised that the fragmented structure meant internal issues were increasingly dominating the attention of key executives rather than a focus on customers and markets. Subsequent analysis explored a full range of structural options (starting with a matrix of 32). The structural options recognised three key functions in the dairy industry manufacturing-marketing value chain, 1) milk processing and manufacturing, 2) merchant selling commodity dairy products and 3) marketing/sales companies. The potential was recognised for each of these functions either to be consolidated into a single entity or exist as competing entities.

The National Government of the late 1990s asked all Producer Boards to prepare plans for deregulation. A clear indication that the single export marketing privilege conferred on the Dairy Board was not going to last much longer.

As a working hypothesis or proposition, the new governance structure was the result of:

1. The evolution of the structure of the industry, namely consolidation of processing companies.
2. The resulting power concentration and balance vis a vis the NZDB.
3. The threat of deregulation signalled by Government.

These three factors could be considered as propositions to understand the underlying drivers that changed the governance structure and ultimately led to the creation of Fonterra

7.3.1 Adding value strategies

In the late 1990s more than 20 per cent of sales were derived from products developed in the 1990s. The Board wanted to increase the value added share of sales from 30 per cent to as close as 100 per cent as possible. The Board was to continue handling commodities but the aim was to ship them to overseas subsidiaries that would pack, reprocess or add value and market it in a multitude of different presentations. It was desired to maintain the single desk export approach and the vertically integrated industry to enjoy stronger competitive power. Although under the Board's co-ordination, the primary marketing expertise was to be developed overseas close to the market action.

Where sales expansion was limited due to import restrictions, revenues would be increased moving downstream into higher return products or by acquisitions moving further downstream in the distribution chain. Market diversification was seen as a means of avoiding excessive exposure in any one country. Yet the Board was to take significant risks in potential future large markets. An example was provided through the establishment in Russia of the Anchor butter brand and the Ferndale small natural cheese brand, which were considered outstanding achievements through successful marketing campaigns. The Dairy Board intended to make a NZ\$1.5 billion on brand investment activity to promote sales of non-commodity products. The "green image" was to be major part of the NZDB promotional strategy

In the late 1990s, 1.1 per cent of total sales revenue was spent on research. The intent was to have dairy processing companies and the New Zealand Dairy Research Institute to develop new value added products. R&D was considered proactive and customer driven through decentralised research centres at various sites in the world.

The NZ dairy industry has always competed as a low cost producer and as a unified organisation against global players. The low cost producer strategy was clearly grounded on endowment of natural resources and evolving cost-efficient production capabilities. It seems to have developed a dual strategy based on a "broadly targeted cost leadership" (Akoorie and Scott-Kennel, 1999) in commodities markets together with a strategy for specialty food ingredients and FMCG targeted at food manufacturers and consumers respectively.

Critical mass in terms of sales volume, market control and resources was essential to make the type of investments required to compete effectively with large global players. Flexibility and adaptability was considered essential due to the changing environment. Relationship marketing and securing leadership in the consumer, specialty ingredients and food service market segments was necessary to ensure the ongoing reputation and success of the Board's industrial products and well-regarded consumer brands.

Respondents highlighted four elements that they saw as determining success during the period. They were:

1. A major commitment to R&D was seen as essential for developing new products and for technological improvements in production, processing and distribution.
2. A strong management information system linked to global learning network was seen as essential for improving marginal performance through time.

3. Continue strategic analysis and management, and the development of corporate strategy that provides a clear vision of the future was seen as essential to ensure appropriate investing of funds and political resources in the most important activities.
4. The ability to maintain substantial control over the entire production and marketing infrastructure was seen as necessary to improve the efficiency and effectiveness of all the components of the industry.

7.4 The period 2001 – 2007

Ultimately discussions and negotiations led to the formation of Fonterra. Dairy farmers were faced with a trade-off of either losing a consolidated international marketing presence or losing local competition in manufacturing. The fear of losing the first is that in-market competition would reduce revenue (especially in quota markets) and the fear of losing the second was that a single entity would become inefficient in its operations. Losing local competition had already been happening for some time due to ongoing consolidation of processing companies.

The formation of Fonterra in October 2001 involved a wider liberalisation of dairy exporting. This encompassed legislative and regulatory interventions to ensure contestability in the market for farmers' raw milk and to foster competition on the domestic consumer market. The Dairy Board's single desk marketing regime was abolished.

Fonterra was established as a co-operative of more than 12,000 dairy farmers. One of the top ten dairy companies in the world, Fonterra is the leading NZ exporter of dairy products and is responsible for a third of international dairy trade, supplying 140 countries around the world. The New Zealand dairy industry is dominated by the Fonterra Co-operative Group Ltd, complemented by Westland and Tatua Co-operative dairy companies. There are also many smaller businesses competing in the domestic and international markets.

The dairy industry is subject to regulation governing open entry/exit of farmer shareholders to Fonterra, quota allocation, the supply of raw milk by Fonterra to independent processors, and herd testing and the herd database operated by LIC Ltd. The thrust of the regulatory framework is to maintain performance incentives on Fonterra through ensuring contestability in the market for farmers' raw milk. The framework also protects competition in domestic consumer markets and prevents Fonterra's dominance from impeding the growth potential of smaller dairy businesses, especially where they depend on Fonterra for milk supply.

Fonterra's size and dominance in the dairy industry means that its performance is critical to the New Zealand economy as a whole, as well as to the dairy industry. The legislative and regulatory framework put in place at the time of the merger is intended to ensure Fonterra faces incentives to perform despite its overwhelming dominance in the market for its key input – raw milk. Over time, the effectiveness of the legislative and regulatory framework will need to be assessed.

Fonterra exports around 95 per cent of the dairy products it manufactures and is the world's largest exporter of dairy products. It is responsible for over 30 per cent of international dairy trade across open borders. It is a major world player in dairy ingredient exports such as milk powder and casein and in consumer products, including through brands such as Fernleaf and Anchor. Speciality products such as ANLENE and ANMUM are leaders in their markets. Fonterra has a wide range of international marketing subsidiaries, joint ventures and other

arrangements, including in the US (with Dairy Farmers of America), North and Latin Americas (with Nestle), in the UK and Europe (with Arla Foods) and in India (with Britannia Industries).

Fonterra's global supply chain encompasses shareholder farms in New Zealand through to customers and consumers in 140 countries. It collects more than 13 billion litres of milk a year and manufactures and markets over 1.8 million tonnes of product annually, making it a world leader in large scale milk procurement, processing and management. It has around 20,000 staff in 40 countries, with over half of its staff being outside New Zealand.

Fonterra is New Zealand's biggest private sector investor in R&D. Its shareholders are world leaders in on-farm efficiency and productivity, and its processing efficiency is also world class. Its new product development capability is significant, with considerable potential for future growth and performance delivery.

7.5 Other dairy businesses

In this period it is important to recognise the participation and role of key dairy industry participants apart from Fonterra. This includes Westland Dairy Company, Tatua Dairy Cooperative, Open Country Cheese, and others.

Westland Co-operative Dairy Company Limited

Westland Co-operative Dairy Company has 370 suppliers and its total turnover in 2001/02 was \$178 million. It collected 337 million litres of milk and manufactured 51,000 tonnes of milk powder, butter and casein in 2001/02. It has traditionally sold through the Dairy Board's (more recently Fonterra's) global networks. However, it is now directly marketing the majority of its own products. Westland plans to double its production in the next decade, largely based on a new milk powder dryer opened in November 2002. More importantly, it has a strategy in place to move away from commodities into added value products such as high value protein concentrates and specialist nutritional and nutraceutical ingredients from milk. Westland is already contracted to supply lactoferrin and other bioactive milk proteins to Tatua.

Tatua Co-operative Dairy Company

Tatua Co-operative Dairy Company (Tatua) in the Waikato processes around 106 million litres of milk annually from around 130 suppliers, focusing on the manufacture of highly processed, added value products. It had total turnover of \$111 million in 2001/02. Tatua has for many years focused on R&D intensive development of new, high value differentiated products, beginning with products such as aerosol whipping cream and later moving into milkshake and ice cream mixes, sauces for the restaurant trade, and high value extracts such as caseinates and lactoferrin.

Tatua is now one of the world's leading manufacturers of specialised dairy-based proteins and protein derivatives. It has recently reached a deal with the Victorian company Tatura Milk Industries to provide it with bioactive milk extracts, with Tatua supplying the extraction technology to the Australian company.

Tatua typically outperforms Fonterra and Westland in per kg payout. This reflects its tight focus on niche markets and speciality high value products and the scale and focus of its R&D. It would be impossible for Tatua to achieve such premiums if it was competing in high volume, price sensitive commodity markets subject to more competitive pressure. Tatua restricts the number of its suppliers and this means that it is not under constant pressure to process and market high volumes of milk for commodity markets, but can take a longer term view of market development and product innovation.

Apart from the bigger export companies, New Zealand Dairy Foods is a major dairy industry player supplying around 40 per cent of the domestic market, and there are approximately 70 smaller companies manufacturing and marketing value-added milk-based products. There are around 20 boutique cheese makers, as well as businesses producing fresh and cultured milk, specialist milk powders, ice-cream and edible fats. Examples of smaller, export-oriented businesses include Kapiti Cheeses (which is investing to treble its production and grow its export business), Dairy Goat Co-operative (NZ) which produces goat's milk infant formula and other specialised products, and the Oamaru-based Whitestone Cheeses (gourmet cheeses and organic cheeses).

The Open Country Cheese Company established a plant in Waharoa in the Waikato to produce high quality semi-hard and hard cheese for export to Australian and Asian markets. This processing facility will incorporate a tourist museum and restaurant, based on similar models in the wine industry.

The liberalisation of dairy exporting means there are few barriers to new businesses entering the dairy export business.

7.5.1 Cluster businesses

There are significant businesses clustered around the dairy industry, including:

- Trutest Ltd (milk meters, electronic weighing systems, electric fences, medical electronics)
- DEC International (controlled drug release technology)

- NDA Engineering (dairy engineering)
- McInnes Engineering Ltd (calf feeding systems)
- Otenz Group (dairy milking systems and processing plants)
- LIC Ltd and Ambreed (dairy genetics).

A number of these companies, for example Trutest, are significant exporters in their own right and are in some cases businesses with substantial growth potential. Several companies that grew as suppliers to the dairy industry developed the technological platforms to diversify into completely new markets. For example, Trutest is now developing a medical electronics business and NDA Engineering has developed steel wine-vat technology. (MAF, 2003), Contribution of the Land –based Primary Industries to New Zealand’s Economic Growth)

7.5.2 Fonterra’s strategy

Participants were very interested in Fonterra’s strategy. Some of the key items discussed were risk, international activity, manufacturing activity and capital structures.

Industry participants are very interested in how Fonterra balances its wealth enhancing activities with the risk these activities pose to the company. Many participants were of the view faster growth potential was linked to greater risks. Whilst recognising the case for sustaining a credible growth path many were mindful of the need for appropriate risk management strategies. Participants were quick to note NZ companies that had experience fluctuating fortunes (such as Air New Zealand) and others that had either disappeared or been subsumed by foreign companies, particularly during the 1980s.

Fonterra’s international strategy is seen as core to the success of the industry. However many participants were unclear about what the strategy was and how its different components fitted together. Participants were vitally interest in market reach (in terms of market locations and market partners) and market penetration in terms of the range of products and customers. This has critical links to the manufacturing strategy. Participants were quick to debate the appropriate mix of milk production, processing and marketing activity in specific markets. The Australian opportunities and practices were of significant interest and participants wrestle with the place of Australian milk production and processing for the Australian market and Australian milk production and processing for other markets. They are also conscious of the level of NZ farmer investment in Australian dairy farming and the need for Australian activity which fits Australian needs but is seen to be equitable by New Zealand producers with investments in both places. China was another market where debate surfaced. Participants were aware of the long term potential of the market but were wary about the ability of Fonterra to effectively manage milk production and processing in a different biophysical, cultural and political environment. Fonterra investment in Chile and South America was seen as promising by many while other expressed anxiety as to whether or not New Zealand was just nurturing the development of a competitor industry and likened this to the development of the global kiwifruit industry. Brand strategy and international identify was another matter for debate. Participants recognised the value of a limited number of successful brands and understood the logic of focusing efforts. However, there as uncertainty about how brand identity should be sustained in different markets and how it fitted with a diverse set of collaborating business.

Fonterra’s manufacturing strategy was debated by participants. Efforts to enhance cost effectiveness were applauded but it was recognised that chasing economies of scale and cost

minimisation had its limits and posed significant risks at individual sites. Many participants were of the view that no significant advance had been made in developing a reliable strategy of value adding that could survive the fluctuations in commodity prices and other normal business risks. A constant question was how can value add activity be expanded in a significant way.

Corporate strategy in terms of operations and financing were also a matter for discussion. Participants were aware of the challenge to both progress important initiatives and sustain shareholder understanding and engagement. Some participants expressed frustration about the diverse set of industry organisations but at the same time expressed angst about perceived overreach of Fonterra decision makers and managers. The Fonterra capital structure was a matter of debate. Many participants appeared to have few agreed principles shaping their views about capital structures. People expressed recognition of the need of funds for growth. Others highlighted the importance they placed on capital structures that protected their ownership. Some noted the potential for different capital structures such as that associated with LIC. There were few detailed expressions of the options open to the company.

Many participants expressed frustrations about the R&D strategies and record of both Fonterra and the wider industry. Participants aspired to sustained programmes of investment that had a transformational impact on the industry and which provided a knowledge foundation to address new and emerging challenges. A common theme was the government had become a less reliable partner to the industry and the industry had not been able to effectively offset this perceived withdrawal. Despite this many participants highlighted individual examples of research successes.

In summary, the interviews showed a diversity of views and perceptions of the strategies the NZDB and Fonterra have pursued at different points in time.

7.5.3 Critical success factors and conclusions

The following is a summary of participant's suggestions of success factors in the NZ Dairy Industry:

Success Factors	Explanation	Related Complexities
Successful development of international markets	The successful sale of NZ dairy products around the globe has been critical to industry success. The development of brands and relationships has been especially important.	The industry has largely remained a commodity exporter substantially impacted by pressures in the spot market.
Political support in international markets	The dairy industry has had to cope with subsidized competitors. The NZ government has had an important role in trade negotiations with the EU, the WTO and other governments and agencies.	Political support has involved maintaining relationships with politicians and officials in difficult circumstances.

Political support within NZ	The NZ dairy industry has relied on political support to ensure legislative support for the industry as associated with allocation of research funds and the establishment of Fonterra.	Political support has been at the prices of concession which not all have been appropriate.
The evolution of industry structure to facilitate growth.	The dairy industry has evolved to establish family corporates, a dominant large integrated cooperative, and specialised and sophisticated support industries.	The evolution has involved windfall gains and losses for key payers as participants of understood the consequences of different decisions.
Farmer engagement in the development of industry policy, strategy, structure and operations.	Farmer participation has been critical in the testing of industry proposals, building industry loyalty and	The industry is ruthless in its debates and competent protagonists have at times been lost to industry leadership.
Continuing technological advance.	Technological progress has enabled the industry to grow through increased productivity. This has been on the farm, in processing and along the supply chain.	R&D investment has been inconsistent. IP worries impede dissemination.
Major disease-free status of national herd	Disease free status has reduced barriers for international trade and reduced compliance costs.	Efficient management of animal health policies, processes and funding has involved significant tension
Development of economies of scale	Economies of scale has resulted in improved management and progress in cost reduction.	The result has been limited investment in value added business.

7.5.4 Current and future challenges to NZ Dairy Industry

Participants identified a range of challenges for the industry. Attention focused on the farm, on industry structure and international activities. On farm challenges pertain to cows, pasture, the environment and farm financing and associated generation issues. Despite the tremendous

advance in dairy genetics the industry is concerned about evidence of declining fertility and increasing levels of mastitis amongst NZ dairy herds.

Sustaining pasture production is a challenge given the impact of clover weevil and other pests. Many industry participants feel there has been insufficient scientific research on pasture production issues. In addition to production concerns the industry is conscious of greater public and consumer concern about animal welfare and its implications for the management of farms.

Environmental concerns by domestic and foreign citizens create challenges for the industry. Competition for water resources and the political challenges associated with obtaining access to resources is a major concern. Likewise the determination of appropriate production responses to climate change policies is a major concern. The increased concentration of farming with larger properties and groups of properties is a challenge for both financing and intergenerational transfer, especially when combined with the size of families on many farms compared to past decades.

Concerns about industry structure are largely focused around issues of governance and capital structure. Most participants are positive about the dominant role of Fonterra but there are divergent views about the role of other participants engaged in processing and marketing. Some participants welcome the competition from the merging set of participants and regard them as essential in stimulating the industry's performance. Others see them as artificially favoured by the Dairy Industry restructuring legislation and an unhelpful presence in the global market leading to New Zealanders unnecessarily competing against New Zealanders.

Capital structure issues are hotly debated with aspirations for capital to fund global growth but also a dominant commitment that New Zealand farmers act in ways that do not lessen their ownership rights. The challenge is compounded by the redemption risk facing cooperatives. There appears to be more flexibility in considering a range of ownerships systems in extension, artificial breeding and farming than there is in processing and marketing. However the emerging competitive fringe shows that not all dairy farmers are committed to being members of a dominant cooperative.

A concern frequently expressed by industry leaders was that the industry had not been able to sustain research programmes to the extent they would have liked. Part of the tension pertains to the ability to fund sustainable programmes of research and part relates to the differences in views and commitments of Crown Research Institutes, Universities and the farmer controlled sectors of the industry. There is some tension between overseas based research and NZ based research and short term research funding versus long terms research funding.

The industry is very conscious that this is part of a global industry. For many years it was comfortable with the idea that it was an exporter of NZ dairy products to the world. However, as Fonterra in particular has moved to being a company sourcing milk from around the world and engaged in manufacturing and marketing in a range of countries and a range of partners the strategic challenge is seen as both more promising and more daunting. The industry appears to be of the view that there has been real success in achieving more coherent brand management but is unclear about the strategic imperatives and the basis for resolving the challenges associated with multinational operations. There is some tension between what is appropriate in New Zealand versus what is appropriate in Australia. More and more questions arise as New Zealand farmers expand their operations offshore as well as in New Zealand and dairy industry suppliers allow them. Some see this as a great opportunity whilst others see this as selling our competitive advantage.

References

- ABARE and MAF. (2006). Agricultural Economies of Australia and New Zealand: past, present, future. Retrieved on 25th August, 2007, from http://www.abareconomics.com/interactive/ausNZ_ag/htm/nz_dairy.htm
- Adcock, S. (2003). What New Zealand Dairy Farmers Desire from the Government. *British Food Journal* (Vol. 105, Iss. 1/2, pg.111). Retrieved 29th Nov, 2007 from: ABI/INFORM GLOBAL Database.
- Aitken, J., Dixon, H. (2001). New Zealand: Dairy Industry Restructuring nears Completion. *International Financial Law Review*, 20 (10), p. 68.
- Akorie, M.E.M., & Scott-Kennel, J., (1999), The New Zealand Dairy Board: A case of group-internalization or a monopolistic anomaly in a deregulated free market economy? *Asia Pacific Journal of Management* Vol. 16, pp. 127-156.
- Amor, R., & Saunders, C., (2002), NZ dairy industry - high prices not to last? *Primary Industry Management*, Vol. 4 (5), March, pp. 25-27
- Anon. Fonterra Dairy Processing Plant, Clandeboye. (2007). *Foodprocessing-technology.com*. Retrieved 1st November, 2007, from <http://www.foodprocessing-technology.com/projects/fonterra/>
- Barber, D., (1996), Dairy Board starts to think big, *National Business Review*, Vol. 25 October, pp. 22
- Bates, S., (1998), Milk pricing in UK compared to NZ, *Dairy Exporter*, Vol. May 73(11), pp. 104-106
- Benseman, B. (1990). Managing Production in the New Zealand Dairy Industry. *DSIR Physical Sciences Report 9*. Wellington: DSIR Physical Sciences.
- Bundang, A. R. (2006). Rule of Law. *Business World*. Retrieved July 2, 2007, from ProQuest Database
- Cameron, M. and K. Bell. A Tale of Two Series - Dairy Cow Number and Dairy Farm Numbers in the Waikato Region 1922-2007. Department of Economics, University of Waikato, 2007.
- Charllies, E., Murray, W. (2006). Productive Transformations and Bilateralism in the Semi-periphery: A comparative political economy of the dairy complexes of New Zealand and Chile. *Asia Pacific Viewpoint*, 47 (3), pp351-365. Retrieved 27th Nov, 2007 from: ABI/INFORM GLOBAL Database.
- Clark, H. H. (2007). Clark: New Zealand's relations with Latin America. *Parliament, Scoop Independent News*.
- Cox, T.L., & Zhu, Y., (1997), Assessing the impacts of liberalization in the world dairy trade, *Agricultural and Applied Economics Staff Paper Series No. 406*, University of Wisconsin, Madison, January
- Dairy Adjustment Authority, (2000), *About the Dairy structural adjustment program*, Melbourne.
- Dairy Australia, (2003), *Australian Dairy industry in focus 2003*, ADC, Melbourne.
- Davidson, K.H., (2002), Nestle and Fonterra Co-operative Group: a comparative analysis., *unpublished thesis*. Massey University, N.Z.

- De Lacy, H., (2000), A new structure to break the shackles, *MG Business: Mercantile Gazette*, Vol. 6, Mar 122(5343), pp. 10
- De Lacy, H., (2004), Fonterra restructure likely to stir debate. *MG Business: Mercantile Gazette*, Vol. 27, Sep 128(5453), pp. 10
- Dixon, G., (2001), The price of milk, *North and South*, Vol. Aug 185, pp. 78-84
- Dobson, W.D., & Wilcox, A., (2002), How leading international dairy companies adjusted to changes in world markets.
- Dobson, W.D., (1990), The competitive strategy of the New Zealand Dairy Board, *Agribusiness*, Vol.6 (6), pp.541-558
- Dobson, W.D., (1992), [The Deregulation of the US Dairy industry: implications for world dairy markets](#), *Agribusiness*, Hoboken, Vol. 8, Iss. 5; pp. 457-172
- Dobson, W.D., (1995), Competitive strategies of leading world dairy exporters.
- Dobson, W.D., (1996), Positioning the firm to export dairy products in the 21st century- lessons from the Dairy Boards of Ireland and New Zealand, *Babcock Institute Discussion Paper*, Vol. November 96-3, pp. 29
- Dobson, W.D., (1997), The evolution of New Zealand's Dairy Board: implications for the Board` single desk (monopoly) exporting privilege, *Babcock Institute Discussion Paper*, Vol. 97
- Dobson, W.D., (2001), Policy and management lessons for dairy exporters and investors in foreign dairy-food businesses: What did we learn in the past decade?
- Edwards, G., (2003), The story of deregulation in the Dairy industry, *The Australian Journal of Agricultural and Resource Economics*, Volume 47, Issue 1, Blackwell Publishing Asia, Melbourne.
- Evans, L. (2004). Structural reform: the dairy industry in New Zealand. *APEC High Level Conference on Structural Reform*.
http://www.iscr.org.nz/f194,4059/4059_apec1_essay_090904.pdf
- Fonterra (2007) Fonterra and environment. *Fonterra*. Retrieved 20th November, 2007, from <http://www.fonterra.com/wps/wcm/connect/48cfe400453f0777a38cff9a8f155673/Fonterra+and+the+Environment+-+A+sustainable+New+Zealand+dairying+industry.pdf?MOD=AJPERES>
- Fonterra. (2007) About Us. *Fonterra*. Retrieved 1st November, 2007, from <http://www.fonterra.com/wps/wcm/connect/fonterra.com/fonterra.com/our+business/fonterra+at+a+glance/about+us/our+structure>
- Fonterra. (2007). Sustainable growth. *Fonterra*. Retrieved 20th November, 2007, from <http://www.fonterra.com/wps/wcm/connect/fonterra.com/fonterra.com/Our+Business/Sustainability/Sustainable+Growth/>
- Fox, A. (2006). Why Fonterra has Failed to Deliver. *New Zealand Herald* (May 22, 2006).
- Fraser, G., (2000), Strategy calls for fresh approach, *Dairying Today*, Vol. Feb 92, pp. 8
- Fuller, F. & Beghin, J. (2006). Global prospects for dairy in Argentina and Chile and lessons for U.S. dairy industries. *Iowa Ag Review*, 12 (3). Center for Agricultural and Rural Development, Iowa State University.
- Gardner, J., (2005), De-regulation in the NZ dairy industry, *Primary Industry Management*, Vol, Jun 8(2), pp. 10-11

- GATT (1984) International Dairy products Council. (1984). General Agreement on Tariffs and Trade. Retrieved 19th November, 2007 from:
http://www.wto.org/gatt_docs/English/SULPDF/91100049.pdf
- Gibson, J., Harris, P. and Ware, A. 1995. The New Zealand Dairy Board: A Critique & Analysis of the Position of the Business Roundtable. Cited by Akoorie & Scott-Kennel(1999).
- Gough, M., (1998), What is driving structural debate?, *Dairy Exporter*, Jun 1998; 73(12) pp.82-83
- Halliday, J. (2007). Fonterra considers flotation. *Dairy Reporter*. Decision News Media SAS.
- Holmes, C.W., (1990), An analysis of costs and other factors which contribute to the international competitiveness of the NZ dairy industry. *Dairyfarming Annual*, Vol. 42, pp. 117-118
- Ignacio, D., (2003), *The Challenge of agricultural co-operative internationalisation: case studies of Fonterra and Zespri*, Thesis. Massey University, NZ
- Johnston, W. E. & Frengley, A. G. (1991). The deregulation of New Zealand Agriculture" market intervention (1964-84) and free market readjustment (1984-90). *Western Journal of Agricultural Economics*, 16 (1), 132-143.
- Larsen, W., (1993), Co-operative v corporate structures, *Dairy Exporter*, Vol. Aug 69(2), pp. 74-75
- Levitt, A. (2006).The New Dairy Trade Dynamic. *Dairy Foods*, 107 (10).
- Lynch, G.A., (1998), *The relative advantage and disadvantage of co-operative and non co-operative business organisations*, G.F. Wilson (Ed.), Dairy Farming Annual, Proceedings of the 50th meeting of dairy farmers.
- Lyon, S.C., (1995), *The role of the government in New Zealand Dairy Board access to overseas markets*, Unpublished master's thesis
- McCarthy, I., (1999), The NZ dairy industry - adapting to change? *Primary Industry Management*, Vol. Mar 2(1), pp. 30-33
- McCarthy, I., (2000), The NZ dairy industry: struggling to restructure, *Primary Industry Management*, Vol. Apr 3(1), pp. 17-20
- McEldowney, L., (1994), Board's management restructured to further drive marketing strategy, *Dairy Exporter*, Vol. Mar 69(9), pp. 78-79
- Ministry of Agriculture and Fisheries (2004). The New Zealand dairy industry-three years on from industry restructuring. (2004). *MAF*. Retrieved 1st November, 2007, from
<http://www.maf.govt.nz/mafnet/rural-nz/statistics-and-forecasts/sonzaf/2004/2004-sonzaf-06.htm>
- Ministry of Agriculture and Fisheries. (2001) International Dairy Product Prices. (2001). *MAF*. <http://www.maf.govt.nz/mafnet/rural-nz/statistics-and-forecasts/farm-monitoring/dairy-2001/dairy-2001-03.htm>
- Ministry of Agriculture and Fisheries. (2002). Dairy *MAF*. Retrieved 25th November, 2007, from <http://www.maf.govt.nz/mafnet/rural-nz/profitability-and-economics/contribution-of-land-based-industries-nz-economic-growth/contribution07.htm#Dairy>
- Ministry of Agriculture and Fisheries. (2003). Pastoral agriculture: the competitive edge. The New Zealand Dairy Industry. Retrieved on 25 August, 2007 from
<http://www.maf.govt.nz/mafnet/rural-nz/overview/nzoverview007.htm>

- Ministry of Agriculture and Fisheries. (2005) International Dairy Product Prices. *MAF*. Retrieved 25th November, 2007, from <http://www.maf.govt.nz/mafnet/rural-nz/statistics-and-forecasts/farm-monitoring/2005/dairy/dairy-2005-02.htm>
- Ministry of Agriculture and Forestry. (2003). *Contribution of the land-based primary industries to New Zealand's economic growth*. Retrieved 27th Nov, 2007 from: <http://www.maf.govt.nz/mafnet/publications/>
- Ministry of Economic Development. The company. (2007). *Ministry of Economic Development Home*. Retrieved 12th November, 2007, from <http://www.med.govt.nz/templates/MultipageDocumentPage1053.aspx>
- Mtonga, P. N., (1993), *An analysis of the dairy cooperative industry in New Zealand*, A thesis presented in partial fulfilment of the requirements for the post-graduate Diploma in Agricultural Economics at Massey University
- New Zealand Dairy Board, (1997), *The NZ Dairy Industry: structure of the industry from farm to customer*
- New Zealand Dairy Board, (1999a), *The growth of an export industry*.
- New Zealand Dairy Board, (undated), *Capture the opportunities to be the most profitable unsubsidized Dairy Industry in the world*, The New Zealand Dairy Industry Vision
- New Zealand Dairy Board: Background and Perspectives. (1988). *New Zealand Dairy Board*. Wellington: New Zealand Dairy Board.
- New Zealand Dairy Exporter. (1999). *Livestock Improvement*.
- New Zealand Dairy Group 1919-2001: the New Zealand Co-operative Dairy Company Limited. (2001). Hamilton, N.Z.: New Zealand Dairy Group.
- New Zealand Dairy Group Ltd, (2001), *NZ Dairy Group 1991-2001: the NZ Co-operative Dairy Company Ltd*
- New Zealand Trade & Enterprise. Fonterra Ingredients. (2007). *New Zealand Trade & Enterprise*. Retrieved on 25th November, 2007 from <http://www.nzte.govt.nz/section/11771/18227.aspx>
- New Zealand Trade and Enterprise. (2006). *Dairy processing in New Zealand*.
- NZDB (1984) *A Survey of the New Zealand Dairy Industry*. *New Zealand Dairy Board*.
- OECD (2002) *Global Trends in the Dairy Industry: Outlook for the Baltics*. (2002). *Organisation for Economic co-operation and Development*. Retrieved 25th November, 2007, from <http://books.google.co.nz/books?id=aMGgwrIA8qgC&dq=changes+in+international+dairy+markets&pg=PA7&ots=w8zq7sbwhQ&sig=mTUJBytE9vfauDSDQu7qnmIrC2Y&prev=http://www.google.co.nz/search%3Fhl%3Dzh-CN%26q%3Dchanges%2Bin%2Binternational%2Bdairy%2Bmarkets&sa=X&oi=print&ct=result&cd=1&cad=legacy>
- Ohlsson, C., (2004), *New Zealand Dairy co-operative – strategies, structures, and deregulation*. Master thesis
- Rabobank (2007). Grain process and local thirst absorb Argentinean threat. (2007). *Rabobank New Zealand*. Retrieved 25th November, 2007, from http://www.rabobank.co.nz/inside_rabobank/news/media_releases/media_release_050307.html

- Rabobank. Strong future dairy growth in developing markets. (2006). *Rabobank*. Retrieved 25th November, 2007, from <http://www.scoop.co.nz/stories/BU0611/S00321.htm>
- Reynolds, P. (2006). Agriculture in New Zealand: past, present and future. Ministry of Agriculture and Forestry.
- Rowlands, C., (1969), Co-operation and control in the dairy industry – the farmers’ view, *New Zealand Farmer*, 24 Apr, 90(4) pp.20-21
- Sankaran, J., Luxton, P. (2003). Logistics in Relation to Dairying: The Case of New Zealand Dairy. *International Journal of Operations & Production Management* (Vol. 23, Iss. 5/6, pg. 522). Retrieved 27 Nov, 2007 from: ABI/INFORM GLOBAL Database.
- SNZ (2006) Agricultural Production Statistics. *Statistics New Zealand*. Retrieved 27th Nov, 2007 from <http://72.14.253.104/search?q=cache:-Vs8U1yulRcJ:www.stats.govt.nz/products-and-services/hot-off-the-press/agricultural-production/agricultural-production-ye-jun06-hotp.htm%3Fpage%3Dpara011Master+total+dairy+cattle+new+zealand+2006&hl=z&CN&ct=clnk&cd=6&client=firefox-a>
- Sullivan, D. & Scrimgeour, F.G., (1995), The New Zealand Dairy Board: What is the value added?
- Treasury, The New Zealand (2007). *New Zealand Economic and Financial Overview*. Retrieved 12th November, 2007, from <http://www.treasury.govt.nz/nzefo/2007/03.asp>
- Vandersyp, C.J. (1981). The New Zealand Dairy Industry. *Industry Report No.8*. Wellington: New Zealand Dairy Board. Bank of New Zealand Economics Department
- Willis, R.P. (2004). Enlargement, Concentration and Centralisation in the New Zealand Dairy Industry. Cited by Charlles, E., Murray, W. (2006).

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